[ESTABLISHED 1832]
THE OLDEST RAILROAD JOURNAL IN THE WORLD

AMERICAN ENGINEER AND RAILROAD JOURNAL.

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BY
R. M. VAN ARSDALE, INC.
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J. S. BONSALL, Vice-President and General Manager

F. H. THOMPSON, Advertising Manager.

Editors:
E. A. AVERILL. R. H. ROGERS

DECEMBER, 1910

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attempted in the instance of boilers of the ordinary design.

The absence of these parts, which have become so generally associated with trouble, really constitutes the appeal of this novel but decidedly practical arrangement. The Brotan boiler has no firebox sheets to crack or groove, no crown sheet; and, consequently, no roof bolts and no staybolts. As defective conditions of these parts are responsible for the majority of damages to boilers, a decidedly safer construction becomes herein at once apparent, with the elimination from further consideration of time-honored items of maintenance expense.

The system of construction is strong, and there are no particular obstacles to efficient up-keep. Observations extending over three years or more have shown conclusively that the maintenance cost has been very much less than with boilers of the ordinary type. They give good results, both in steam production and in keeping up pressure, and their first cost is some 20 per cent. less than a boiler of the common form.

Doubt has been expressed in some quarters regarding the reliability of the figures issued from the roads where the Brotan boiler is in service covering its economical features, but this need not be entertained in the slightest degree. The strict government supervision of railroads in those countries insures accuracy in all data returned to the government, and it is interesting in this connection to note that the report on the Brotan boiler from the Moscow-Kazan Ry. indicated such a high percentage in economy that it was checked by further test runs before being accepted as authentic.

It is felt that this boiler, which is now safely beyond the experimental stage, will be further developed with the painstaking care which is so prominent a characteristic in foreign railroad procedure. It would be interesting, indeed, and we believe well worth the trial if some railroad in this country would give it the same thorough try-out. The inference is not intended in this connection that the Brotan boiler would be adapted to our varying service requirements at large, but it is confidently believed that in many services it would work with far more economy and efficiency than many of the existing designs.

PLASTER OF PARIS PATTERNS FOR DIES TO MAKE PRESSED STEEL CAR SHAPES

The editorial mention last month* of the economy which would result in the instance of a railroad making its own pressed steel car shapes brings the following very interesting letter, which, on account of its novel and decidedly valuable suggestion embodied, is reproduced without abbreviation.

TO THE EDITOR:

In reference to your editorial in the November issue, in which you say that the high drawing room and pattern costs, in particular the latter, operate against the railroads getting out dies to make their own pressed steel shapes for car repair, I have a suggestion to offer, which if properly developed should abolish these two items of cost altogether.

While I do not know a great deal about the design, or even the appearance of car shapes, such as I have seen did not appear to be very elaborate. Some of them, in fact those which require the greatest number of renewals, so I have been told, are quite simple, in some instances being merely a flat piece of iron with a few right angle bends. You no doubt know what I mean in this connection better than I do myself, so I will not go further in trying to describe the shapes.

My idea, in brief, is to stand the shape itself, for which dies are required, upright in a box, or some contrivance of the kind, and then fill around it with plaster of Paris. It seems to me that when this sets, and it is carefully sawed into two parts at the proper place, you would have in reality two plaster of Paris reproductions of just what the top and bottom cast iron dies would have to be to make that shape in the flange press. Having secured the plaster of Paris moulds, my thought is that they might be considered as patterns. In other words, send them to the foundry and let them ram them up and pour, just the same as they handle the regular wood patterns, only with a little more care.

I have never tried this, of course, because I never had the chance, but I have been thinking it over for some time in connection with applying it to some bridge work parts. When I saw your editorial referred to, it struck me that it might be equally applied to car shapes. At all events, it may help to solve the cost problem which you said interferes with the railroads providing themselves with dies for car work, even though they may have a flange press which is practically standing idle.

C. S. HIGHAM.

Although the above is, of course, undeveloped, we think well of the idea from its practical aspect. There is no reason why a steel shape cannot be set up edgewise in a rough wood box, either rectangular or square, and the plaster of Paris poured around it as suggested. A laborer at $1.25 per day could knock the box together in a few minutes, fill the mould and part it. No drawings or prints become necessary, as the shape itself forms the guide, and the pattern shop cost, of which we have had something to say, is eliminated.

The idea appeals to us as being well worthy of a trial. Certainly the expense of the latter will be insignificant, and if the plaster of Paris patterns obtained are sufficiently strong to withstand the foundry operations, there is nothing to prevent the success of the scheme. Car shapes, as a rule, are rough, and their exact dimensions need not be absolutely insisted on in the instance of repair parts where there is generally considerable latitude allowable. Therefore the item of shrinkage when the dies are cast from these plaster of paris patterns, which, of course, would represent the finished size of the dies, need not seriously interfere with the results.

LOCOMOTIVE TERMINALS

In the January, February and March issues of this year, there appears an extensive discussion of the many features and details, which, taken altogether, go to make up a satisfactory and efficient arrangement for properly taking care of locomotives at division points. As locomotives continue to increase in size the difficulty of properly caring for them is increasing at even a higher speed, until at present, there is probably no subject more worthy of attention and study among the large number which are constantly confronting motive power officials.

In this issue is devoted a large amount of space to a full description of a moderate sized terminal which has recently been constructed at Corning, N. Y. This terminal is the result of a long and careful investigation of the subject and in many particulars forms practically a model for division points handling between 75 and 100 locomotives in twenty-four hours. While, of course, it is possible to criticize some of the details of this arrangement the essential features are practically perfect. All of the most important appliances that have proven themselves to be thoroughly satisfactory have been applied and particular attention has been given to furnishing comfortable surroundings and ample facilities so that high grade workmen will be able to give high grade results.

POPPET VALVES FOR LOCOMOTIVES

The possible use of poppet valves to effect the steam distribution in locomotive cylinders has never been viewed with favor in this country, but the success which has attended the innovation abroad must necessarily impel some serious consideration of the subject. In several quarters of Europe it has been unqualifiedly endorsed by the highest authorities (and this is especially true in

* See page 440, November issue.

the instance of the Prussian State Railways, where it is embodied in the very latest types of locomotives.) Particularly this motion is said to be applicable to high speeds, working safely and exactly at revolutions ranging from 250 to 300 per minute. The type employed is that of Lentz, and it was prominently featured in some powerful express engines at the Brussels Exhibition.

In this clever and decidedly interesting treatment of a somewhat difficult proposition, the four double-seated poppet valves, controlling the outlets and inlets, are arranged to operate vertically in a cast iron valve case which is bolted steam tight to the cylinder proper. The actuating mechanism of the valves consists of a simple cam rod, corresponding to and about in the same location as the valve stem in American practice, the movement of which, derived from the outside link valve gear, raises and lowers the valves on their respective seats at the proper interval.

The conclusions which inspired this gear were based largely on the knowledge of the increasing use of high pressure, and particularly of high degrees of superheat which revealed deficiencies in the ordinary D and piston valve gear. It was also appreciated that with the ordinary valves a complex guide motion was necessitated which was scarcely suited for high speeds. A further advantage claimed for this system is the positive closing of the valves even with high degrees of superheat, as well as favorable conditions of opening and accelerated closing. The valves also offer positive security against water hammer, through their practical operation as safety valves of large section.

When the laborious and painstaking efforts which characterize experimental work on European railways, with the certainty of achieving ultimate results before anything is permanently adopted, is borne in mind, it is quite evident that the Prussian State Railways, and others interested, are not blundering blindly into radical transformation of previous devices. The very fact of the Lentz valve application to the fastest express engines on those railways affords food for thought, and certainly for speculation on the outcome. Whatever the developments may be, they will be awaited with unusual interest, as the correct interpretation of the valve gear problem is not the least important question with which railroads at large have to deal.

AN ILL-ADVISED STANDARDIZATION

From all accounts the standardization of locomotives in India, which has been under way in somewhat desultory fashion since 1903, is proving to be largely barren in results, the reports therefrom indicating that after seven years' trial that country is no nearer to having standards than it was at the incipiency of the idea. The efforts made toward that end have been watched with much interest both at home and abroad, and especially in England, where the plan was from the first sensibly viewed with distrust. Now that the results expected have not materialized it is not surprising that the present attitude of the English technical press is to belittle the proposition in general, and to hold up its non-success as an object lesson to other countries who may incline toward similar procedure.

It is extremely improbable, however, that any such thing will be again attempted anywhere. It should never have been essayed in the first place, and never would have been in this country, but still the lessons taught may be of value. This Indian endeavor was not intended to be the mere standardization of power by an individual line within itself, but was broadly aimed to include locomotives of all lines. Properly viewed it appears as a preposterous scheme; one from which, even if successful, little benefit could accrue. Primarily, however, criticism may be best directed toward the manifest short-sighted policy of attempting the production of an universal standard engine to serve indefinitely the continually varying requirements of rapidly expanding railroads. Although it is true that in maturing this ill-advised scheme some six or eight so-called standard types have been laboriously evolved, they were out of date practically on completion, or, as even more forcibly put by one of the Indian motive power men, "The ink was hardly dry on a set of drawings before it was found that something more powerful was needed."

To predetermine general engine types for the future is absurd or paradoxical, because the inference may be readily drawn that so long as they cannot be adapted to a possible expansion in traffic, the traffic must be adapted to them. If heavier paying loads are offered, and they will increase year by year in that rapidly growing country, they cannot be accepted as single train weights, because the latter must necessarily be rigidly defined in accordance with the capacity of the standard freight locomotive. There is no economy in double-heading, or in running sections of trains when one section should suffice. Standardization in this broad application becomes a bar to the progress and prosperity of all the railroads involved. It effectually checks the development of the locomotive, which can only follow where competition is present, or through a recurrence of original designs, and it may as well be added that quite a field for development yet remains in the present design of the Indian locomotive. It would, indeed, be unfortunate should this be retarded through a vague and elusive chase for types which at the best can only live their day.

The fact is interesting, although there is nothing mystifying about it, that the new standard types are doing no better than the engines which they superseded. India is a country affording every possible variation in physical characteristics. In one section it is mountainous, with heavy gradient roads and high degree curves, and in another practically level, with tangents of unusual length. The former locomotives were designed to meet strictly local conditions, while now the standard freight engine, for instance, is entirely unsuitable in its role as a general machine for all conditions. This, of course, needs no argument to substantiate, and yet this standard locomotive was designed as a composite type to be used anywhere in India. If adequate for grade work it would not make time on a level road, or if equal to low grade requirements, its high wheel was not adapted to hill climbing, and so on.

It is recalled that some years ago in the United States the same scheme was discussed with some attempt at gravity, although the discussion was entirely informal, and the matter never came before a body whose influence might be strong enough to put it under way. In brief, as we recall it, the proposition was for all motive power officials to get together, as they have subsequently done to their regret in India, with the end in view to limit the design of power in general to less than six standard types.

For all around work, in fast freight and passenger service, the ten-wheel, or 4-6-0, was suggested; the 2-6-0 for ordinary freight; the 4-4-0 for local passenger, and the 0-6-0 for switching purposes. This matter was talked over thoroughly, but there was no attempt at concerted action. It was contended that the cost of locomotives would be greatly reduced when generally standardized, and in fact about the same arguments were advanced as in the instance of the Indian conclave. Fortunately, the wild scheme never became foisted on this country.

Much useful work has been done in India during the past seven years in standardizing specifications, certain features of equipment, etc., and therefore the labors of the committee have not by any means been altogether to no avail. The only feature to be regretted was that it did not stop when the standard locomotive question was reached, and devote its energies to securing uniformity in details, and in maintenance methods, but not in types, which can never be brought about in India or any other country.

THE ANNUAL INDEX

The annual index which it has been our custom to issue with the December number, will this year accompany the January issue. We will be able, however, to furnish copies of it to those who wish to have their volumes bound up immediately, by December 15.

Railway Business Association Dinner

An air of cheerfulness and optimisim was everywhere to be seen at the closing of the second annual dinner of the Railway Business Association where 800 members and guests had listened attentively to the speeches of Martin A. Knapp, chairman of the Interstate Commerce Commission; Daniel Willard, president of the B. & O. R. R. and of the American Railway Association and John Claflin, president of the H. B. Claflin Co. The statements and remarks of these spokesmen for the three principles in the present rate controversy—the government, the railroads and the shippers—gave good reason for cheerfulness to the members of an association dedicated to fair play. It was clearly evident that the spirit of fairness and justice to the railroads as well as to their patrons for which the Railway Business Association has been working since its organization is becoming, largely through its efforts, more generally recognized as not only right but also the best business policy.

To Geo. A. Post as organizer and president of this unique Association is due a large part of the credit for its most gratifying success, and it was Mr. Post who for the second time occupied the chair of toastmaster at the dinner held on the evening of November 22, at the Waldorf-Astoria, New York. At the speakers table in addition to Messrs. Willard, Knapp and Claflin were many other well known men, among them being the following:

E. A. S. Clark, Lackawanna Steel Company; James J. Hooker, president, Receivers and Shippers' Association; George W. Simmons, vice-president, Simmons Hardware Co.; John Kirby, Jr., president, National Association of Manufacturers; C. M. Schwab, president, Bethlehem Steel Company; Isidor Strauss, of R. H. Macy & Company; Ralph Pulitzer, publisher, *New York World;* A. B. Hepburn, president, New York Chamber of Commerce; George W. Perkins, of J. P. Morgan & Company; John Wanamaker; John C. Spooner, former United States Senator; Frank A. Munsey, publisher; W. E. Cory, president, United States Steel Corporation; W. P. Hamilton, editor, *Wall Street Journal;* Otto H. Kuhn, of Kuhn, Loeb & Company; Warren S. Stone, grand chief, Brotherhood of Locomotive Engineers; and P. H. Morrissey, president, American Railway Employees Association. The Public Service Commission of New York was also represented at the speakers' table by several members.

A number of songs, written for the occasion by Paul West, proved a most entertaining feature.

Abstracts of the three principle speeches follow:

Abstract of Mr. Knapp's Address.

The question of railway rates, that is to say, of railway revenues, involves vastly more than the direct interests of shippers or shareholders. In a very real sense, in a sense which is fortunately coming to be better understood, it is a great question of national policy second to none in its economic importance. That the compulsion of competition among the carriers is an unwise and mistaken policy I am persuaded. It is out of the question to have the presence of competition and the absence of discrimination. Just so long as competition between carriers is unrestrained, just so long will it result in policies which are dangerous, for to compete is to discriminate. It is a fallacy to condemn discrimination and at the same time to insist upon the very policy which promotes it. For this reason I advocate the legal sanction of coöperative action between railways regarding rates.

Speaking only for myself, and without reference to the pending controversy over rate advances or any other concrete instance, I suggest three aspects of this question which are of immediate and intense public concern. If our country is to grow and prosper as it ought, if its untold resources are to be developed as they ought, and its swelling numbers find profitable employment as they ought, we need and must have railway earnings sufficient for three things:

First, a return on railway investments of such amount and so well assured as to attract and secure the necessary capital—an enormous sum in the aggregate—to improve existing roads and to construct without delay thousands of miles of new lines in fruitful districts now destitute of any means of transportation. It is a matter of common knowledge that the output of traffic for the fiscal year 1907 exceeded our entire carrying capacity on land and water. With the rapid increase of population and of productive efficiency, that is, with a greater army of workers and better industrial organization, the volume of that year ought to be and will be nearly doubled in another decade if only we can provide for its prompt and proper distribution. And when we think of the rich regions yet unopened because unserved, when we recall, for example, that there is today in the old state of Maine a section larger than the whole of Massachusetts in which there is not a rod of railway, must we not be impressed with a realization of pressing need and of boundless opportunity. Since it our national policy—and long will be, I trust—to rely upon private capital and private enterprise to provide these great highways of commerce, to improve and multiply them in pace with our requirements, must we not in the larger public interests, whatever may be thought by this or that shipper, make the business of furnishing railway transportation, which shall be up to the best standard of efficiency, convenience and safety, so desirable to the investor that the necessary funds for betterments and extensions will be forthcoming, and so attractive as a vocation that the highest ability will be employed in its management? Otherwise, if unhappily this is not done, must not our country come measurably to a standstill and face a future of comparative stagnation?

Second, the payment of liberal wages to an adequate number of competent men. This not only to insure increasing skill and reliability in a service which is all the while becoming more exacting, and on which the safety and comfort of the public constantly depend, but also because of the very great influence of railway wages upon the compensation of labor in every sphere and grade of private employment. To my mind the fundamental social problem is to provide, by the wise development of our institutions and without radical action or injustice, for a more equable diffusion of the bountiful wealth which the earth produces. Now, as a large and increasing majority of the able bodied live, and must live, by working for others in some capacity, a high and advancing standard of payment for service of every sort tends strongly to promote, and is the best practical means to bring about, the degree of equality in social welfare which makes for the satisfaction and happiness of all our people.

Third, the betterment of existing lines so as to greatly augment their serviceableness to the public, as can in varying degree be done everywhere, without unnecessary and undesirable increase in capitalization. Every dollar borrowed to improve a road now in operation involves a permanent addition to the interest charge which the public is required to pay; the improvement from current earnings puts no lien upon the property but rather augments its value and usefulness, and by adding to the security of the capital already invested tends to a lower rate of interest upon that capital. Broadly speaking, this means a national policy, so to speak, in respect of railway rates and revenues in harmony with our national policy in other matters of public concern, and in accordance with that enlarging spirit of altruism which manifests itself in public as well as in private life, and which impels the present assumption of burdens that might be escaped or deferred in order that another generation may have an easier task and a larger opportunity. Is it not in this particular field a wise and patriotic policy?

Abstract of Mr. Willard's Address.

The industries represented by your association constitute a powerful economic force, and your organization has for the first time brought that force to bear on public opinion. It was fortunate for the railways of this country, and I believe a fortunate thing for its commercial industries as well, when the Railway Business Association was formed. You have already performed a most valuable service in the way of bringing about a better understanding between the railway managers and the railway users, and your efforts in that direction deserve hearty recognition. I do not hesitate to say that the railways fully appreciate and gladly acknowledge what you have actually accomplished and will welcome a continuation of the same policy.

I am extremely anxious to see a better understanding reached between the railways and those who use them; but, I have never seen any substantial or lasting progress made towards such understanding by parties holding views greatly at variance, until they were both ready and willing to accept the truth, if it could be found and act accordingly.

The American railway, except in the extreme East, has almost universally gone ahead of the population or even the settler. The building of a railway under such circumstances was a hazardous

undertaking Men could not be found willing to assume the altogether too apparent risk of loss, unless in some manner there was thought to be something which promised large reward. In many instances large reward was realized. Had it not been so there would have been no railways. Similar risks were assumed in other enterprises in a new country and similar expectations of large reward were indulged in and just as frequently realized.

In the course of time complaints began to be made that the railways were showing special favors to some individuals and communities and withholding such favors from others. It was claimed that rebates were being granted the better to cover up the transaction. It was claimed also that the roads charged less in some instances for a long haul than for a shorter haul when the circumstances were substantially the same. It was claimed that the railroads exercised a controlling influence over some of the legislative bodies, such influence resting largely upon the issuance of free transportation and in some cases the actual payment of money. It was claimed that the railways were overcapitalized and that in some instances large fortunes were made by improper, not to say illegal, practices in that connection. Doubtless there was sufficient cause for complaint. To hold otherwise would be to hold that men engaged in railway affairs were not subject to the same human limitations and weaknesses that are known to be the common heritage of mankind. It was claimed that the pooling practice, at that time much in evidence, was inimical to the interest of the shipper and its abolishment was demanded, though so far as I am able to learn, no general complaint was ever made that rates, as a whole, were excessively high. Other minor complaints against the carriers were also registered.

The feeling aroused by these various practices finally found expression in laws, notably the Interstate Commerce act, with successive acts amendatory thereof.

Granting, for the sake of argument, that the builders, owners and managers of the railways were in common with the rest of mankind subject to all weaknesses and limitations that the human race is heir to, let us see how much foundation in fact there is, or ought to be, at the present time for such distrust as still seems to exist.

The rebate and unjust discrimination have disappeared, or, if not altogether, then the relief is to be found in the enforcement of the existing law. I submit no additional law is necessary in that direction. The long and short haul question seems to be fully covered by the recent ammendment. Recognizing, however, the far reaching effect the so-called long haul practice has had upon the general commercial and industrial development of this country, Congress has seen fit—wisely, I think—to give the commission much latitude concerning it. A strict and literal enforcement of the law would mean commercial disaster to many communities.

The influence of the railways upon legislation has been, I believe, largely if not entirely eliminated. This has come about partly by the people requiring of their representatives a closer accountability and partly by the fact that the railways, recognizing the higher ethical standard concerning such matters to-day, have endeavored to adjust their practices in harmony therewith.

The claim that the American railways are over-capitalized is still urged in some quarters. In that connection the following comparisons of capitalizations per mile are interesting:

England	$275,040
Belgium	169,806
France	139,390
Austria	112,879
Germany	109,788
United States	59,000

In my opinion to duplicate the American railway system to-day would cost a sum very much in excess of the existing capitalization, and while I do not believe a physical valuation of the railways would serve any useful purpose, I am convinced that the railways have nothing to fear in that direction.

James J. Hill, whose knowledge of this subject rests upon the most careful thought and inquiry, has well said: "The American railway pays the highest wages in the world out of the lowest rates in the world, after having set down to capital account the lowest capitalization per mile of all the great countries of the world."

While the railways as they stand to-day, have cost nearly $14,000,000,000, as shown by their outstanding capitalization, it is certain that the development of the country will make necessary further large expenditures for additions to and betterments of the existing lines. It has been well stated that one billion dollars a year, for a number of years at least, will be absolutely necessary for these purposes. How will the money be obtained? By offering something in the way of a security sufficiently attractive to make the money forthcoming; for, as one of the honorable members of the Interstate Commerce Commission has well said:

"We can provide by legislation the sort of cars which a railway shall use and the rates which it shall impose; we can not by legislation force one single dollar of private capital into railway investment against its will."

Much has been said about what is a fair and reasonable return on money invested in railway securities. If the railways were finished and no new capital needed, it might then be interesting to discuss what rate of interest or dividend should be paid in the future on money borrowed in the past. That, however, is not the situation; the railroads are not finished and they will need and must have large sums in the future and it will not be obtained by telling the man whose money is desired that he will be paid a *fair* rate. The man who has money to lend, taking him as a class, will decide, not what is a fair rate, but what is a *satisfactory rate to him,* and in reaching that conclusion he will be influenced by many elements, not necessary now to refer to, but which taken as a whole constitute credit.

The question of what is a fair and reasonable freight rate is also a difficult one to determine. Certain it is, as I view it, that the sum of all such rates must at least be sufficient, when combined with efficient management, to furnish such net earnings as will enable the individual road to obtain the necessary new capital when needed on a favorable basis, otherwise, because of impaired credit, money could not be raised at all, or if raised, then under such conditions as would probably add to the embarrassment.

I assume we are all equally interested in the prosperity of our country as a whole. We can not have such prosperity as we all desire while the second largest industry in the land, measured by capital investment, remains inert. I positively know that there is to-day in the minds of railway managers a feeling of hesitancy, of uncertainty, as regards the future. Possibly that feeling is not justified by the facts, by the conditions. Possibly the managers are mistaken. None the less, the feeling is there and it is dominating the situation, and the all important question is—how can it be corrected? How can the feeling of distrust, which now rightly or wrongly so powerfully influences the policy of the railways, be allayed? I should say by removing the cause, and, unless I have altogether failed to make clear what is in my mind, I think the cause, as I view it, should be apparent; but to be specific, let the people who use the roads and want the roads, now indicate that, having secured the passage of such laws as they considered necessary in order to correct the conditions complained of in the past, they are now willing (as I think they should be) to open a new account with the future. Let them consider each new proposal for legislation with entire freedom from any spirit of retaliation. I do not say that it is encessary to undo anything already done (although experience may show such action to be wise in some instances), but I do say that the railways should be given a respite from further legislation—State or Federal—for a time at least, and until they can work out some of the many problems now confronting them. If such a course should find favor in the minds of the people and reflected in their attitude toward the carriers, I do not hesitate to say that the patient now indisposed would immediately show signs of convalescence.

The remedy suggested is not a serious one. Is not the experiment worth trying?

ABSTRACT OF MR. CLAFLIN'S ADDRESS.

How to meet the increased cost of living is a problem of the time. We may partially explain the advanced prices of what we eat by the reduced proportion of food producers to food consumers, and we may to an extent explain the increased cost of other things which we use by the high wages and the decreased efficiency of labor, but these explanations only show us that we may not soon expect any considerable reduction in the cost of living; that as investors and as business men we must face increased expenses, and it behooves us to determine what we can do, if anything, to increase the income of the community in general and of ourselves in particular.

The railways up to a certain point have indicated the way in which increased expenditures can be met. They have been able to increase their business largely, and a similar increase of business is the solution of his particular difficulties that every merchant would welcome. The railways now have reached a point where it seems difficult for them to continue to increase their gross revenue materially without very great expenditures for betterments and for extensions. Under ordinary conditions the money to pay for such extensions and betterments could readily be had by the sale of bonds bearing a moderate rate of interest. At the present time, however, investors are asking larger returns on their capital than in the near past, and foreign investors, especially those who seek only the choicest of American securities, are inclined to be indifferent to the offerings of America railways, because they are doubtful in view of the recent advance in wages by the railways, whether or not the railways now have a safe margin of profit which will enable them to pay interest on all their fixed obligations and to continue reasonable disbursements to their shareholders. It seems to me the solution of this doubt is of the utmost importance to the general prosperity of

this country, and its solution may be facilitated or delayed by the attitude of the merchants of the United States in regard to the advances in freight rates which the railways have proposed.

As a wholesale merchant in New York the question to me is partly academic because as a wholesaler I pay but a small portion of the freight which is charged on merchandise shipped from New York, but as an investor in retail stores throughout the country, the question lies within the scope of my personal investigation and may affect my income largely. I ask then, will it be advantageous for the average merchant outside of New York to pay some increase in freight rates to help the general situation? I think it will.

This solution of the problem for the merchant as well as for the railways seems to me the logical way out. Mercantile expenses cannot be reduced materially without reducing business proportionately, but under the impetus of a general growth of the country, mercantile business may increase in the future as it has increased in the past with sufficient rapidity to keep expenses within reasonable ratio to the amount of sales.

How can the general growth and general prosperity be best promoted? I think the railway will answer this question satisfactorily if by friendly co-operation we give them the power to go ahead.

At the annual business meeting of the Association the following officers were re-elected: President, George A. Post; vice-presidents, H. H. Westinghouse, O. H. Cutler, W. H. Marshall, E. S. S. Keith, A. H. Mulliken, O. P. Letchworth, A. M. Kittredge; treasurer, Charles A. Moore.

The Lentz Poppet Valve Gear

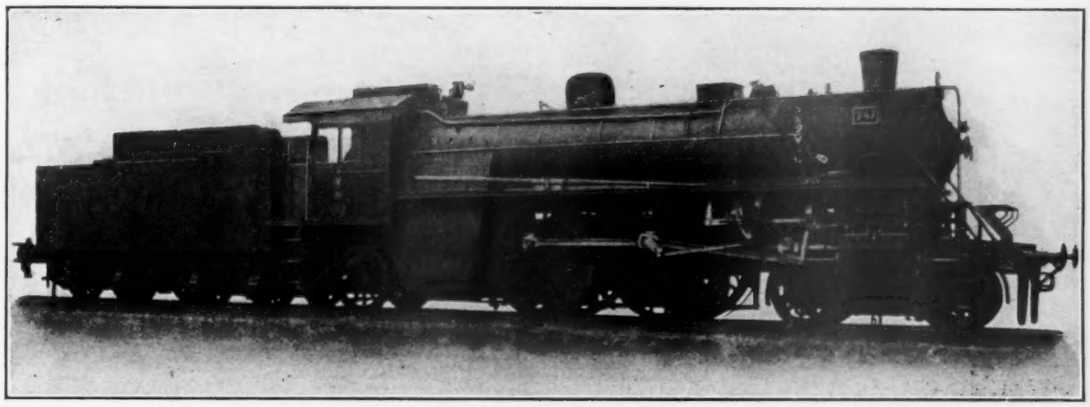
FOR HIGH SPEED WORK AND GENERAL EFFICIENCY THIS NOVEL VALVE GEAR IS VIEWED WITH FAVOR BY MANY FOREIGN ROADS

The possible use of poppet valves to effect the steam distribution in locomotive cylinders has never been attempted in this country, but the success which has attended the innovation abroad must necessarily impel some serious consideration of the subject. In several quarters of Europe it has been unqualifiedly endorsed by the highest authorities, and this is especially true in the instance of the Prussian State Railways, where it is embodied in the very latest types of locomotives. Particularly this motion is said to be applicable to high speeds, working safely and exactly at revolutions ranging from 250 to 300 per minute. The type employed is that of Lentz, and it was prominently featured in some powerful express engines at the Brussels Exhibition.

The Hannoversche Maschinenbau A. G. of Germany was the first to apply this gear to a locomotive engine in 1905, when a 2-4-0 tank engine was being rebuilt. On the same occasion a press locomotives are now in course of construction, for which the Lentz gear has been specified.

In this clever and decidedly interesting treatment of a somewhat difficult proposition, the four double-seated poppet valves, controlling the outlets and inlets, are arranged to operate vertically in a cast iron valve case which is bolted steam tight to the cylinder proper. The actuating mechanism of the valves consists of a simple cam rod, corresponding to and about in the same location as the valve stem in American practice, the movement of which, derived from the outside link valve gear, raises and lowers the valves on their respective seats at the proper interval.

The four valves (two inlet valves towards the middle and two outlet valves toward the ends) are placed in a row, one behind the other. They are constructed as double seat valves. Their spindles are fitted with so-called labyrinth packing only,



LOCOMOTIVE ON THE PRUSSIAN STATE RAILWAY EQUIPPED WITH LENTZ POPPET VALVES

Pielock superheater was installed, and the engine achieved in service a saving in coal of 19.5 per cent. and a saving in water of 30.56 per cent., as compared with similar tank locomotives fitted with slide valves, and working with saturated steam. These figures were accurately determined during a series of trial runs. As no fault was found with the Lentz poppet valve gear of this locomotive, which is still used in heavy regular train service, two others in 1906 were similarly equipped. These, a four cylinder balanced compound, and a six wheel coupled tank locomotive of standard gauge, were exhibited at the Milan International Exposition of 1906.

Although the departure from existing types of cylinder valves was rather startling, the new design grew rapidly in favor, and it may now be said to possess a favorable reputation. Up to May, 1910, stationary engines, locomotives, traction engines and marine engines, with a total of 1,114,000 indicated horsepower have been fitted with this gear. Fifty-seven high-powered ex-

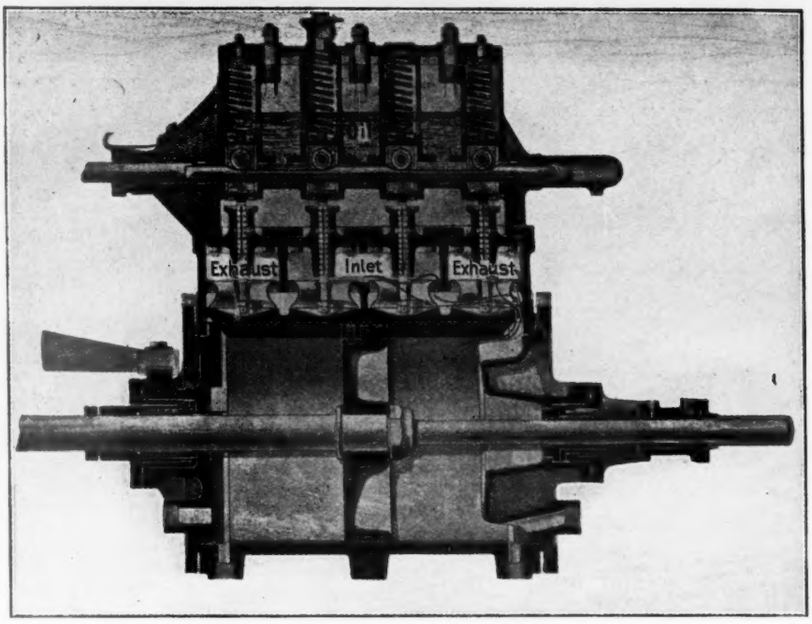
which, as experience in steam engines goes to show, can be made to work perfectly steam tight and at the same time practically without friction, when accurately constructed. The valves weigh but 7.3 pounds each and are weighted by springs.

This brief explanation roughly describes the general arrangement, but the design embodies many important details which compel admiration through the ingenuity displayed in their application. For instance, the cast iron valve case previously mentioned is in two sections, the upper section containing the spiral springs encircling the valve spindles to insure their positive closing at the highest number of revolutions, while the lower part of the case becomes an exhaust chamber, fitted with small pipes to drain off whatever steam and condensation which may escape through the spindles. These latter, screwed into their respective valves, move steam tight in cast iron guides, thus isolating the upper from the lower part of the valve case.

The detail construction of the valve spindles is very interest-

ing. They carry, above what may be called the dividing line of the valve case, broad cylinder heads, in which very hard ground rollers are arranged. It is against these rollers that the cam rod acts, by means of cams of special form, on which the rollers turning freely in the spindle head, have their movement.

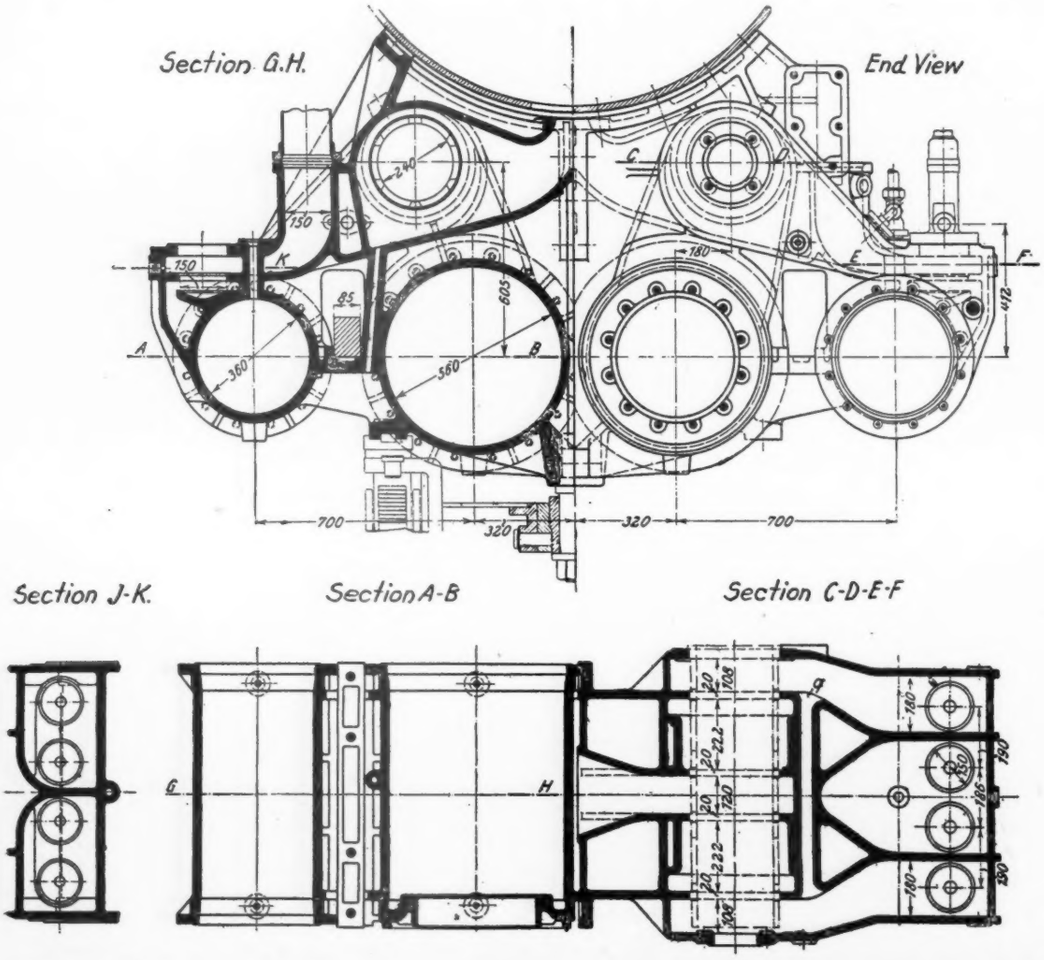
Referring again to the upper part of the valve case, this being steam tight in relation to the lower part, opportunity has been taken to convert it into an oil bath, so that the rollers, spindle heads, and the cam rod work in a continuous lubricant. This portion of the valve case is supplied with oil through an ordinary cap nut, or through one of the heads provided to remove the valve spindle spiral springs should this prove necessary. It may be mentioned in this connection that the natural objection which might be raised to the necessity for applying springs to rapidly working poppet valves need not be considered serious in this construction, as the valves are almost perfectly balanced, and comparatively weak springs have been found to be adequate.



GENERAL ARRANGEMENT OF THE LENTZ POPPET VALVES

The conclusions which inspired this gear were based largely on the knowledge of the increasing use of high pressure, and particularly of high degrees of superheat which revealed deficiencies in the ordinary D and piston valve gear. It was also appreciated that with the ordinary valves a complex guide motion was necessitated which was scarcely suited for high speeds. A further advantage claimed for this system is the positive closing of the valves even with high degrees of superheat, as well as favorable conditions of opening and accelerated closing. The valves also offer positive security against water hammer, through their practical operation as safety valves of large section.

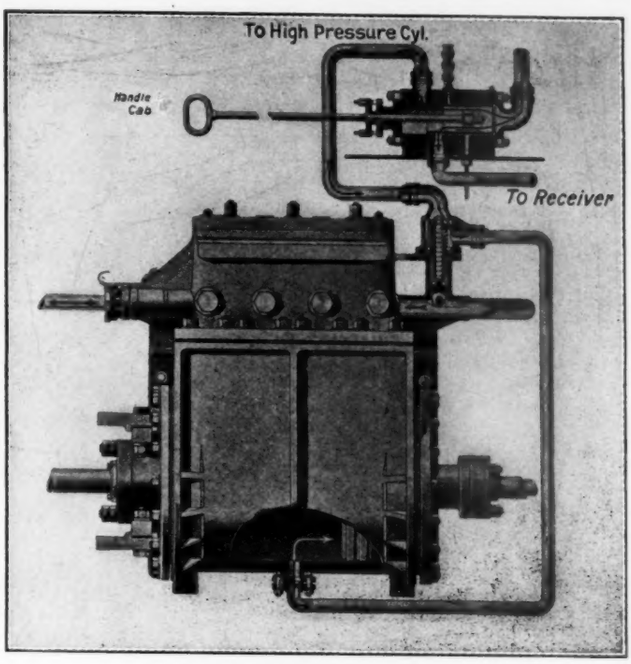
In conjunction with this form of poppet valves Ranafier's starting gear is very frequently employed and is viewed with



CYLINDER DESIGNED TO USE LENTZ POPPET VALVES (THE DIMENSIONS ARE IN CENTIMETERS. 1 CM. = .3937 INCH)

equal favor. It forms one of the features of the four cylinder compound locomotive herein illustrated, and which was awarded the grand prize at the Brussels Exposition. The claim made for the Ranafier apparatus is that an extremely high tractive effort is developed and that all degrees of cut off can be employed, no matter at what speed the engine is running when the locomotive is working compound.

The gear consists in the main of a valve placed above a front extension of the slide valve rod which is in operation when the



RANAFIERS STARTING GEAR USED ON COMPOUND LOCOMOTIVES

engine is running in the ordinary manner, being held against its seat by the spring. If it is desired to increase the tractive effort, live steam can be fed from the boiler to the starting valve by means of a special steam distributing piston, which can be worked from the foot plate by a pull handle. This produces a pressure above that of the atmosphere, which tends to open the valve and causes the roller fixed to the latter to be pressed against the valve rod. As soon as the roller sinks into a special notch on the rod, the starting valve is opened, thus opening the passage for live steam to the middle of the high pressure cylinder. If, however, the piston is not in the proper position in the cylinder, the valve rod closes the auxiliary valve until it passes the center, thus providing by the position of the notch that a counter pressure cannot be produced through the live steam pipe, no matter what the position of the cranks may be, and no matter whether the engine is running forward or backward. Should, however, the position of the cranks be unfavorable, so that the auxiliary steam supply to the high pressure cylinder is cut off, the steam distributing piston must be moved further forward. This operation opens a pipe connection which conducts live steam to the receiver, so that the low pressure cylinder, the main distributing gear of which allows a degree of admission up to 90 per cent., can also be supplied with steam at high pressure. The device is arranged so that the steam distributing piston is made to close by steam pressure. As soon as the starting effort has produced its effect, after one or a few revolutions, the device closes automatically when the handle in the cab is released. The starting valve is now brought back by the pressure of the spring to the position of rest, which allows of the free movement of the reversing rod under the roller.

When the laborious and painstaking efforts which characterize experimental work on European railways, with the certainty of achieving ultimate results before anything is permanently adopted, is borne in mind, it is quite evident that the Prussian State Railways, and others interested, are not blundering blindly into radical transformation of previous devices. The very fact of the Lentz valve application to the fastest express engines on those railways affords food for thought, and certainly for speculation on the outcome. Whatever the developments may be, they will be awaited with unusual interest, as the correct interpretation of the valve gear problem is not the least important question with which railroads at large have to deal.

PENNSYLVANIA RAILROAD TO USE MCADOO TUNNEL.—Negotiations have been completed between the Pennsylvania Railroad Company and William G. McAdoo's Hudson-Manhattan Railroad Company, whereby after July 1 the Pennsylvania local traffic, instead of coming to the new Pennsylvania station at Thirty-third street and Seventh avenue, will be diverted from Newark to the McAdoo tunnels, leaving the large terminal free for the handling of through trains from the west, Washington, Baltimore and Philadelphia and the Long Island traffic. This interesting information was given by William G. McAdoo, president of the Hudson-Manhattan Company, in an interview, in which he discussed the plans of his company for further extensions and improvements of its tunnel and subway systems.

CREWE WORKS TO TURN OUT ITS 5000TH LOCOMOTIVE.—C. J. Bowen Cooke, the chief mechanical engineer of the London and North-Western Railway, has announced that next year, the Coronation year, will witness the completion of the 5000th locomotive at the Crewe Works. It was in 1866 that the 1000th engine was turned out, Mr. Ramsbottom being the chief engineer, and the 4000th was completed in March, 1900, under Mr. Webb. It is now 67 years ago that the first locomotive was built at Crewe. The 5000th engine will probably be one of a new type of passenger tank engine. In all 20 of this class are to be constructed of the 2-6-4 type. The cylinders will be 18½ in. in diameter and the coupled wheels 5 ft. 6 in.

TELEPHONE DISPATCHING ON THE BOSTON AND MAINE R. R.—The Boston and Maine R. R. is gradually substituting the telephone for the telegraph in train dispatching. It now uses the telephone on three circuits: From Boston to Fitchburg, a distance of 51 miles, involving 102 miles of wire and 19 stations, which was installed August 22, 1909; from Concord to White River Junction on the Concord division, a distance of 87 miles, involving 174 miles of wire, with 28 stations, which was installed in April, 1910, and on the White Mountain division, 94 miles long, with 188 miles of wire, which was installed October 10, 1910.

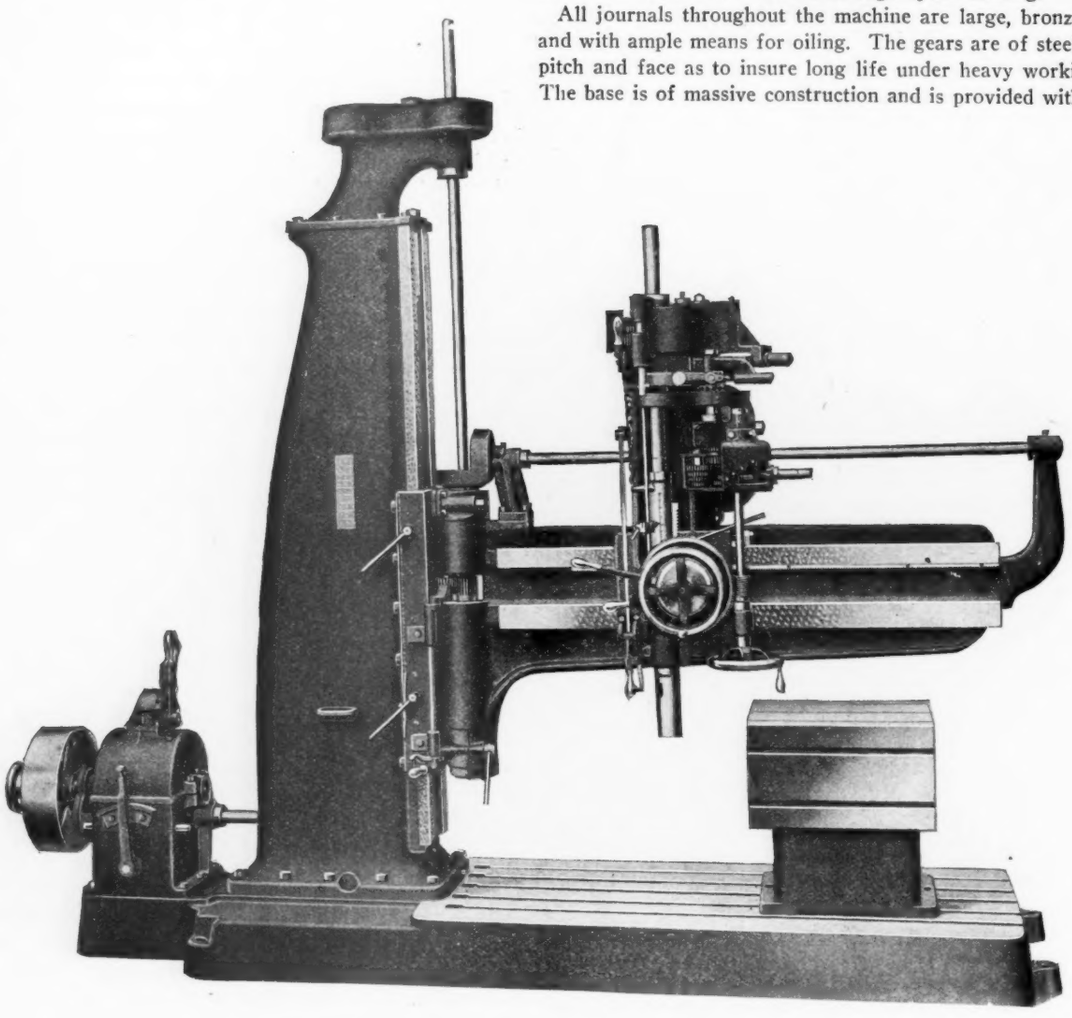
BALTIMORE AND OHIO ELIMINATING TUNNELS.—Indicative of the improvements being made by the Baltimore and Ohio is the work of tunnel elimination that is being prosecuted throughout the system, open cuts being substituted wherever practicable. Particularly is this the case on the Cumberland division, whereon, between the towns of Cumberland and Grafton, four of the six existing tunnels are being made open-cut, and the big Kingwood bore is being rebuilt and equipped with a modern ventilating system that will conduce materially to the comfort of travelers and trainmen alike.

NEW HAVEN TO PENSION OLD EMPLOYEES.—At the annual meeting of the stockholders of the New Haven Railroad, held in New Haven on the afternoon of October 26th, the directors were empowered to pension employees for long and efficient service. The matter was presented to the board by President Mellen and the action taken because a doubt had been expressed by legal representatives as to whether or not the directors could legally vote such pensions. Mr. Mellen offered resolutions empowering the directors to pay such pensions after long and faithful service and on certain occasions, where the directors might consider it proper, to the families of the men who were deceased. The resolution was seconded by J. P. Morgan.

POWERFUL RADIAL DRILL FOR HIGH SPEED WORK

The specific field for drilling machines has formerly been the drilling and boring of holes of comparatively small diameters, but the steady development of this tool has resulted in the reaming and tapping of holes being added to the work of the drill, and by means of special tools and fixtures much work formerly done on the lathe is now being performed on the drill press. As a manufacturing tool the latter is steadily growing in favor, due to its simplicity, the readiness with which it can be gauged, and its comparatively low cost.

The machine herein illustrated represents the new radial drill, built by the Fosdick Machine Tool Co. of Cincinnati, O., which has been designed in 4, 5 and 6 ft. sizes for use of high speed steels, and which embody every feature to be found on an up-to-date drill. The machine is the standard of the makers, and is of the box column type which has proved its superiority in strength of other designs.



VERY POWERFUL RADIAL DRILL BUILT BY THE FOSDICK MACHINE TOOL CO.

It will be noted that the arm is of the massive pipe section construction, the weight of which is carried on a heavy ball bearing, thus insuring easy rotation in the trunnions. The head is of simple construction, and has a long bearing on the arm. The back gears are located in the head, which permits of short and heavy shafts, very essential for modern high speed drilling. They furnish three changes of speed, and can be engaged or disengaged while the machine is in motion. The reverse functions are also operated from the front of the head, and are of the well-known toggle joint type, and will transmit the full power put in the machine at the lowest speeds. At the back of the head is the tapping attachment, fitted with large clutches which are provided with adjusting screws to take up the wear.

When the machine is fitted with the speed box eighteen spindle speeds, ranging from 16 to 360 revolutions per minute, are obtainable, and when fitted with cone pulleys there are twelve speeds. The spindle is made of crucible steel, accurately ground, and is fitted with a No. 5 Morse taper. The feed box is of the maker's well-known tumbler gear design, and permits eight changes of feed, ranging from .007 to .064 in. per revolution of the spindle. As the efficiency of a tool of this class depends very largely upon the convenience of manipulation, special attention to the location and arrangement of the operating levers is given. All feeds are instantly available while the machine is working by means of one lever. The quick return has also been redesigned to meet the modern demands of high speed drilling.

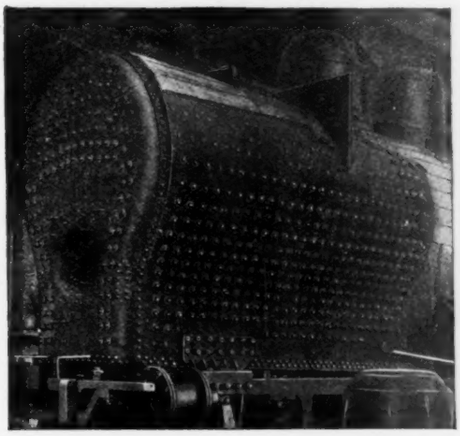
All journals throughout the machine are large, bronze bushed, and with ample means for oiling. The gears are of steel, of such pitch and face as to insure long life under heavy working loads, The base is of massive construction and is provided with large T slots, as is also the box table. These machines can be arranged for variable speed motor drive or constant speed motor drive through cone pulley or speed box.

THE MONORAIL CAR running between Bartow and City Island, New York, which met with an accident on the first day of its operation three months ago, has been rebuilt, and the road which has been carrying passengers experimentally for some weeks, hopes shortly to commence regular service under a new franchise.

RECORD COAL TONNAGE ON THE GREAT LAKES.—The highest coal tonnage record ever made in lake shipments will be broken this year. Officials of the coal companies in the Pittsburg district, which are heavy lake shippers, estimate that the 1909 movement for Northwest ports will be exceeded by 3,000,000 tons.

IMPROVED STAYBOLT CONDITIONS

During the last six years under the increasing use of the flexible staybolt, marked advancement has been made in the methods of staying to afford a less rigid construction in locomotive firebox assemblage. The practice in vogue in which the flexible staybolt is used in localities of greatest sheet expansion, point conclusively to the fact that not only is the breakage of staybolts reduced, compared to the use of the rigid staybolt, but in many instances it is practically eliminated, and side sheet cracking and rivet seam leaking is less frequent, demonstrating the advisability of providing suitable means to allow the heat-absorbing surfaces of the locomotive fireboxes to expand under less restraint than that afforded by the method of rigid staying. The expansion and contraction of the firebox sheets as well as the expansion of the outer shell of boiler, differ not so much in their relative course of extension when under temperatures



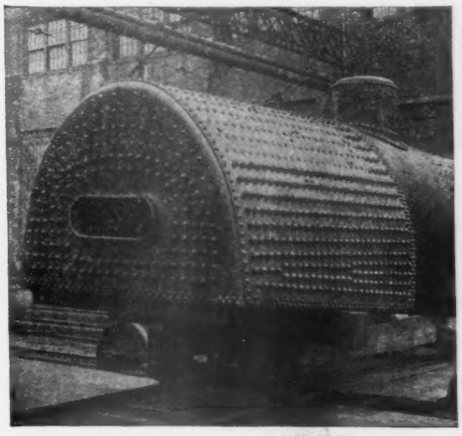
of working pressures, as during the period of firing up, when from the cold to the hot state of boiler, the differences in the amount of expansion is sufficient to seriously strain all parts rigidly connected subjected as they are to excess stresses, due to inequalities of sheet expansion.

The continual deterioration and consequent destruction of all materials involved in firebox assemblage, resulting in staybolts breaking, fire sheets distorting and cracking, and rivet seams leaking is due largely to rigid construction, as the strains induced by the stress of unequal expansion of sheets rigidly stayed, is too severe to warrant safe conclusions, and although quality of material is an essential safeguard in all cases of boiler construction, it fails, however, to cope with the alternating stress due to expansion in the locomotive firebox type of boiler, where the inequalities of sheet expansion are so severe under varying temperatures of boiler operation, that unless mechanical means are provided to accommodate the relative expansion of plates, destruction of material will result by reason of the resulting strains not calculated for. The use of the rigid staybolt for locomotive firebox construction in high pressure service, where sheet areas and heat-absorbing surfaces are subject to considerable expansion by reason of large dimensions and high temperatures, operates to restrict the natural course of the relative sheet expansion, especially in localities far removed from the neutral point in the firebox assemblage.

Flexible staybolts of various designs have been used to some extent for the past fifteen years, but little or no attention was given to them generally, by reason of faulty design and weak construction to meet satisfactorily the full requirements of firebox practice and service operation. Experiments, however, naturally led to modifications and the Tate flexible staybolt, which was brought to the attention of the railway world six years ago, has done more to establish the merits of the flexible staybolt and advance the methods of locomotive firebox staying to obtain satisfactory service results, than any other means known to former practice.

The Flannery Bolt Co., of Pittsburgh, manufacturers of the Tate flexible staybolt, has recently made a large addition to its factory to enable it to meet the increasing demand. The whole plant has been remodeled to more systematically handle all parts, and the several departments are driven by electric motors, divided into units, and most of the machine operations are done automatically, the forge department being most excellently equipped for the special work outlined.

WHEELING LOCOMOTIVES.—In some of the shops with longitudinal pits it is sometimes impossible to clear the space reserved for wheeling the outgoing locomotives at the time when they are ready to be put on their wheels. In one shop this difficulty was avoided by clearing a space on the floor alongside the locomotive to be wheeled and set the wheels properly spaced and blocked just opposite their respective pedestals. The locomotive was then lifted by the crane and swung over and set down upon the wheels



far enough to permit a bar being slipped beneath the rims and across the top of the frame, but still without letting the weight of the boilers and frame rest on the axles. The blocking is then removed and the locomotive with its wheels suspended in this manner is set down upon the pit in the regular manner. The rods and piping can then be put up and other finishing work proceeded with until the space near the exit door is clear.

STANDARD SAFETY APPLIANCES.—The Interstate Commerce Commission, on October 15th, issued its order for the uniform standards for the equipment of cars and locomotives with safety appliances, in accordance with the agreement already announced. This order applies only to new equipment. The commission states its intention to devise some plan regarding existing cars, which will not be burdensome. Secretary Moseley has been seriously ill since the day of the agreement regarding standards.

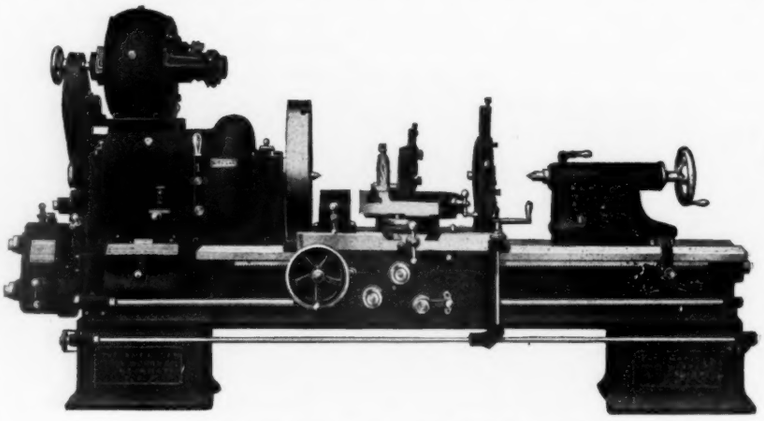
PRESIDENT JAMES T. HARAHAN, of the Illinois Central Railroad, has confirmed the reports of his prospective retirement, naming January 12, 1911, as the date. "It is true," he says, "that on January 12 I shall have reached the age of seventy years and shall be retired automatically as president, according to the rules of our pension system."

NEW STEEL CARS FOR THE LEHIGH VALLEY.—An order for forty all-steel vestibule passenger coaches has been placed with the Pullman Company by the Lehigh Valley Railroad. They are to be delivered in March and April of next year and will be put into service at once. In addition to these coaches, the Lehigh Valley has ordered from the Pullman Company two combination baggage-library-buffet cars, each 75 feet long and containing chairs for 23 passengers. These have all the appointments of the most modern car of that type, and, like the coaches, are steel throughout. It is announced that in the future the Lehigh Valley Railroad will follow the policy of having all its new passenger cars of fireproof construction.

THE LATEST DEVELOPMENT IN ENGINE AND MOTOR DRIVEN LATHES

The exacting requirements of modern lathe construction have been well met in the two fine examples of engine and motor drives, which in sizes 14, 16 and 18 in. for the former, and 20, 24, 27, 30 and 36 in. for the latter, are the latest output in that line of the American Tool Works Co., Cincinnati, O. It would be, in fact, difficult to find a design which so adequately combines the necessary elements of heaviness and rigidity, and where the deflection of the bed, due to its own weight and the pressure of the cut, has been confined within such narrow and well designed limits that it need not be considered.

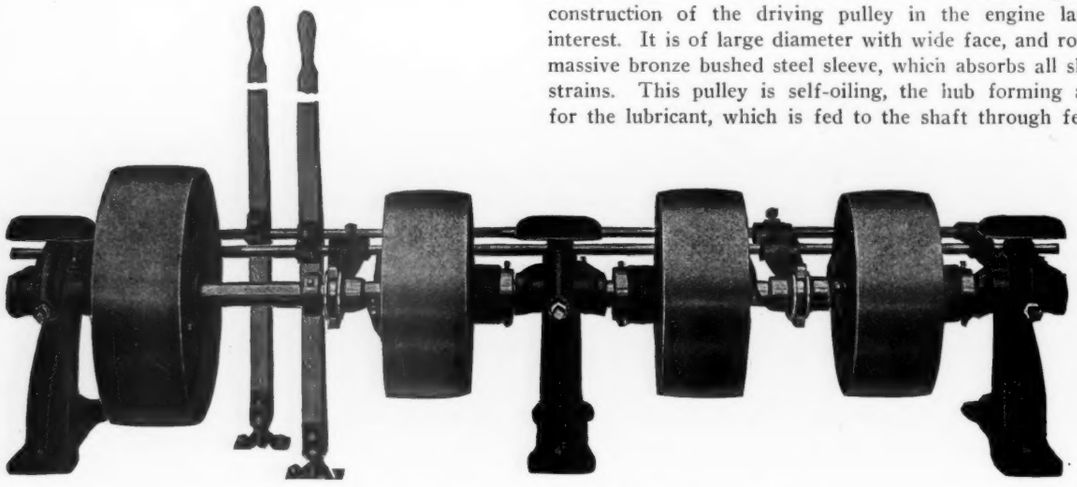
Despite the unusual strength, which is so plainly in evidence, these lathes present a remarkably clean-cut and finished appearance, which has been largely secured through an elimination of surplus stock where not required, and by augmenting the proportions of the parts where stresses are most in evidence. It has thus been possible to produce a very handsome and substantial tool, embodying unmistakable unbreakable features in connection with parts where failures usually occur, and with a capacity for continuous hard service at high speeds and heavy feeds.



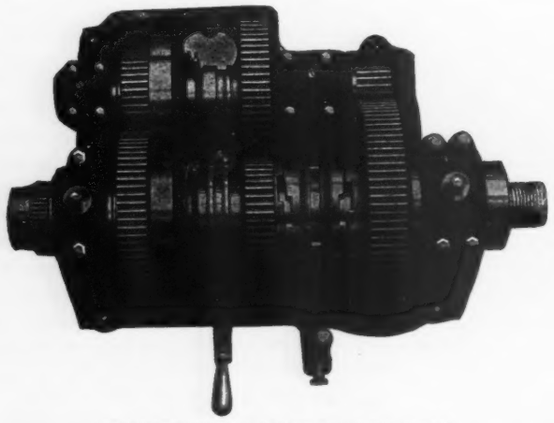
RIGID AND POWERFUL MOTOR DRIVEN LATHE.

Several details of these modern geared head lathes merit a careful study, as representative of the highest present day development in machine tool design. One of the most important in this connection is that the frictions used in the geared head are of the manufacturer's double band type, the same as those which have accomplished such remarkable results with the American Tool Works Co.'s plain radial drills. Another prominent and much to be commended feature is the extreme simplicity of this head, there being only six gears to produce the mechanical speed changes.

The same feature of simplicity applies to the counter shaft, which is regularly furnished with these lathes, and which affords two forward and one reverse, or three forward speeds. The construction of the driving pulley in the engine lathe is of interest. It is of large diameter with wide face, and rotates on a massive bronze bushed steel sleeve, which absorbs all shocks and strains. This pulley is self-oiling, the hub forming a retainer for the lubricant, which is fed to the shaft through felt wipers.



TYPE OF COUNTERSHAFT USED WITH THE ENGINE DRIVEN LATHE



ARRANGEMENT OF GEARS IN THE HEAD.

This has proved to be an exceptionally excellent point, and has given general satisfaction.

Motor drive may be readily secured from the belt-driven machine at any time by removing the single pulley, mounting any type of variable speed motor on the flat place provided on the headstock, and connecting the motor to the driving shaft of the head through spur gearing. A motor may also be placed at the rear of the machine and connected to the driving shaft by either silent chain or belt.

The larger motor driven lathe, 36 inch size, is of particular interest at this time when independent motor drive is being so generally applied to machine tools. To secure the proper spindle speeds for an electrically driven lathe, the most practical and economical method is to supplement the fundamental mechanical speed changes through convenient levers, with electric speed changes, advancing and receding by small increments at the will of the operator through a motor controller handle conveniently located. The controller handle in this design is located on the right end of the carriage, where it is always convenient for starting, stopping or reversing the motor speeds. A speed index plate shows the maximum and minimum spindle speed for each of the four mechanical speeds in the headstock, in connection with motor speeds, and indicates the positions of the two levers on the headstock for each mechanical speed change.

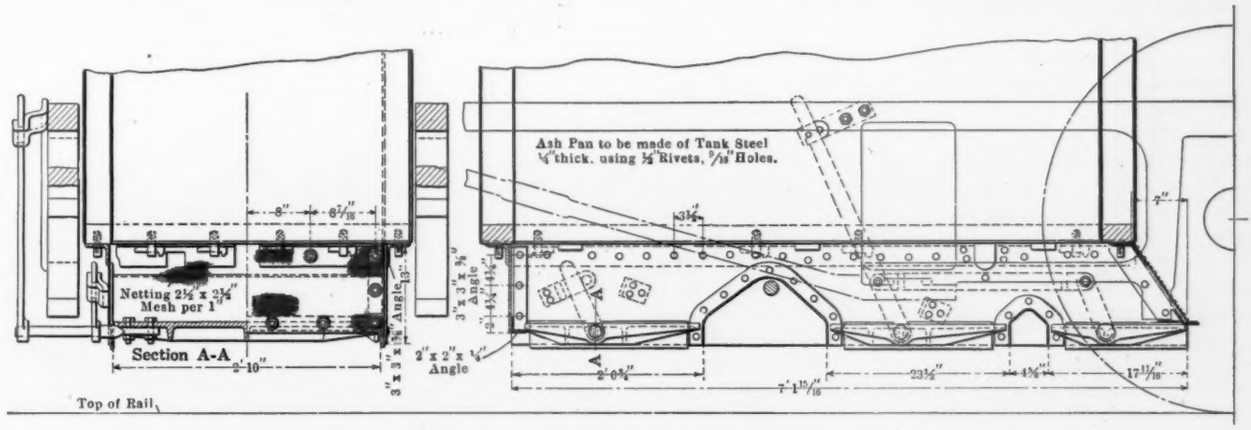
All gears on these lathes are cut from the solid with special cutters, and are of coarse pitch and wide face. Steel gears are

liberally distributed throughout the machines where found necessary. Journals for spindle bearings are of bronze, and all gears are neatly covered. Rapid change gear mechanism provides a wide range of change for feeding and screw cutting, instantly available without the removal of a gear. The apron is "fool proof," it being impossible to simultaneously engage the feeds through the rod or screw. These lathes are built in even lengths of bed to any desired length.

SELF CLEARING SHALLOW ASH PAN

PENNSYLVANIA RAILROAD.

In addition to the ash pan designed by H. A. Hoke, assistant engineer of the Pennsylvania Railroad, to meet the requirements of the Federal laws, and which has been described and illustrated in this journal,* a patent has been granted to Mr. Hoke on one of another design, which is particularly applicable to locomotives requiring a shallow ash pan low down and between the frames. The new pan, herein illustrated, has been applied to



SELF-CLEARING TYPE OF SHALLOW ASH PAN—PENNSYLVANIA RAILROAD

several hundred engines of the Pennsylvania Railroad, replacing the original arrangement which embodied a solid bottom and front and back doors through which the ashes were raked.

The drawing very clearly indicates the construction of the new pan which possesses the commendable feature of great simplicity with a minimum maintenance cost. With the exception of the dumping feature it follows the general design of the original pan, in fact it has been found thoroughly possible to rebuild the latter in this new form. The front and back doors have been replaced with netting, and the former solid bottoms with cast iron doors. It will be noted that these doors are supported on trunnions which are eccentrically located. These are journaled in the sides of the pan body, and are operated by levers extending to one side of the firebox. When convenient, the doors may be connected to one operating lever.

On account of the eccentric locking the operation of the doors, even when the pan is full, has been found comparatively easy, and the design in general gives very satisfactory results on the class of equipment where used.

A NEW CORROSION RESISTING METAL

Of the many subjects which are of interest to the sheet metal worker and the user of sheets there is none of such vital importance as the subject of corrosion. Manufacturers of sheets for a considerable time have been carrying on a series of exhaustive tests and experiments to produce a material which would be reasonable in price, meet all requirements, both as regards corrosion resisting qualities and working qualities; a material with which to combat and overcome the ever increasing prejudice against sheet metal for building purposes, a prejudice which has of late years been steadily increasing due to the unsatisfactory lasting qualities of a large majority of the materials which are now on the market.

The requirements have been successfully attained by the Stark Rolling Mill Co., of Canton, O., in its Toncan metal, the development of which had for guidance the methods of the old time ironmasters in the production of corrosion resisting material. It is an indisputable fact that this quality of the early sheets were due entirely to their uniformity or homogeneity, which was made possible through the proper selection of raw materials through the principle involved in their handling and through the care and attention with which the iron was made. Plenty of time was given the raw materials while in the furnace to eliminate any excess foreign impurities present and to properly combine those remaining, and also by handling the iron after it came from the furnace in such a manner that segregation did not take place during the reheating or working up processes.

Toncan Metal is classed as a metal rather than as iron or steel; because while it has corrosion resisting qualities equal to the old time iron, it also combined many characteristics of the highest grade mild open hearth steel, making it the ideal material with which to meet all requirements of modern sheet metal practice, in that it will not only withstand corrosion, but also the strains and stresses of shaping and forming without fracturing.

INDIANAPOLIS RAILWAY AND MECHANICAL CLUB.—This is the name of a new organization of mechanical men connected with the railways operating in the vicinity of Indianapolis, Ind. At the organization meeting, held September 14, the following officers were elected: President, F. C. Pickard, master mechanic, C., H. & D.; vice-president, C. M. Stark, general foreman, Indiana Southern; secretary, B. S. Downey, chief clerk to master mechanic, C., H. & D.

CAR HEATING IN THE PENNSYLVANIA ELECTRIFIED ZONE.—For use during the cold weather when the trains of the Pennsylvania Railroad entering the New York station through the electrified tunnel zone are disconnected from their steam locomotives and taken across the Jersey meadows and through the tunnels by electric locomotives, steam generated in electric boilers will be used to maintain the temperature in the cars and keep the train connections from freezing. These boilers, which will utilize the 600-volt direct current from the third rail, are capable of generating steam at a pressure of 80 lb.

MORE THAN 1,000,000 TONS OF IRON ORE has been shipped from Bell Island mines, Newfoundland, this year by the Dominion Steel Corporation and the Nova Scotia Steel & Coal Company.

* See AMERICAN ENGINEER, October, 1910, page 407.

SHOP WATCHMEN

The position of a watchman about railroad shops is one not ordinarily associated with much importance, therefore it is interesting to note the development which the Lake Shore and Michigan Southern has attained in connection with this particular classification of labor. In the organization of its motive power department,* the duties of watchmen have been arranged and systematized to such a thorough degree, that instead of the sinecure which the job ordinarily implies, the company has the services of trained and trustworthy men for work which is ordinarily characterized by laxity or even non-observance.

For instance, the chief watchman is practically in charge of an intelligence office. He telephones to and calls men from the shops in the instance of sickness or death at home; directs strangers through the plant when they come with the proper permit; receives hourly reports from the various subordinate watchmen scattered throughout the various departments; and last, but not least, conducts an employment bureau.

This last detail is quite interesting, as the hiring of all labor is largely under control of the chief watchman's office. Each foreman sends a daily notification of his particular needs, and as applicants present themselves they are questioned regarding their experience, ability and age, and if thought to be acceptable are sent under the conduct of a watchman to the foreman handling their particular line of work. It will be recalled in this connection that a great many shops in this country can be entered almost at will, and that many foremen with their valuable time fully occupied are compelled to waste no inconsiderable part of it discussing with obviously unsuitable labor which should have had a preliminary weeding out at the shop gate.

The subordinate watchmen have routine duties sufficient to occupy them throughout their night or day trick, but not so exacting as to prevent them from taking the necessary time to study a condition which might be improved to the company's benefit. In particular they are charged to take every possible precaution against fire. There are 102 fire alarm stations in the Collinwood shop, 43 fire hose stations, and 49 fire hose reels, all of which are carefully examined every day and receive a general inspection by the watchmen every week, each inspection being a matter of record.

As would naturally be expected in this complete organization, each watchman's report of his trick concisely portray the conditions. These are made on a standard form, which in addition to the fire protection mentioned, provide for reporting lights out of order, leaky steam and water pipes, and a space in which to cite conditions not enumerated, such as accumulations of dirt, broken window glass and doors, and in fact anything which might appeal to the watchman as implying laxity or deterioration. The night men use the clock system, ringing at hourly intervals, while the day men are in constant communication with the chief watchman's office by telephone, advising him of their movement, and reporting anything which requires immediate attention.

Making what may be called a real job of one in which the duties are generally regarded as perfunctory has accompanied the putting into operation of a few of the modern large plants, principally Collinwood and Angus, and its success is such that it merits careful consideration. Heretofore much of the important work which now devolves upon the watchmen was supposedly looked after by the several foremen, and many of us are well aware how it was usually slighted, because each foreman had his time fully occupied in securing the output of his shop.

The larger railroad terminals include shops which have grown to cover many acres, and their careful policing, both within and without, is an essential detail which this admirable system appears to satisfactorily solve.

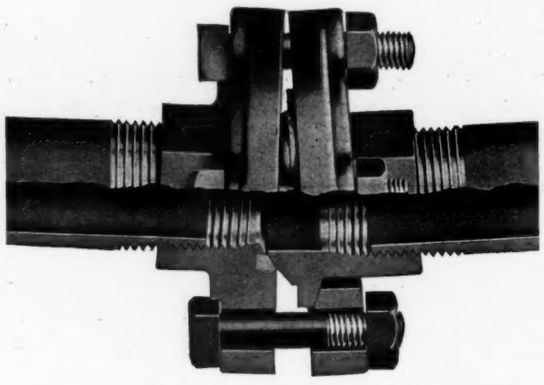
THE DETROIT RIVER TUNNEL of the Michigan Central Railroad was opened to regular passenger service October 16.

* See AMERICAN ENGINEER, December, 1908, page 453.

FLANGE UNIONS WITHOUT PACKING

The distinguishing features of the flange union manufactured by the Jefferson Union Co., of Lexington, Mass., are the loose collar and the spherical brass to iron seat which requires no packing. The loose collar permits the opposing members of the union to be screwed on the pipe to just the proper position without the necessity of bringing the bolt holes directly opposite. The collar can then be turned around until the bolt holes are in line. It will be noted that the two end members are made hexagonal in shape so that they can be readily grasped with any kind of wrench.

The most interesting detail is perhaps the construction of the gasketless seat. Both the convex and concave members are



spherically ground to a perfect fit, so that no matter at what angle the connection is made a tight joint will be secured and the pressure in drawing up the union will be at all times normal. In the concave face a narrow channel is cut and a ring of drawn brass tubing is so firmly embedded that it becomes practically one piece with the iron. This brass ring projects slightly above the surface of the iron and is ground to fit the convex face of the opposing member. This brass-to-iron joint is non-corrosive, and a fitting may be set up and taken apart and reset again any number of times without injury.

The union illustrated here will successfully hold pressures to 300 pounds. Two heavier fittings are made, styles "D" and "E," both of which are heavily bolted and guaranteed to stand a working pressure of 3,000 pounds per square inch.

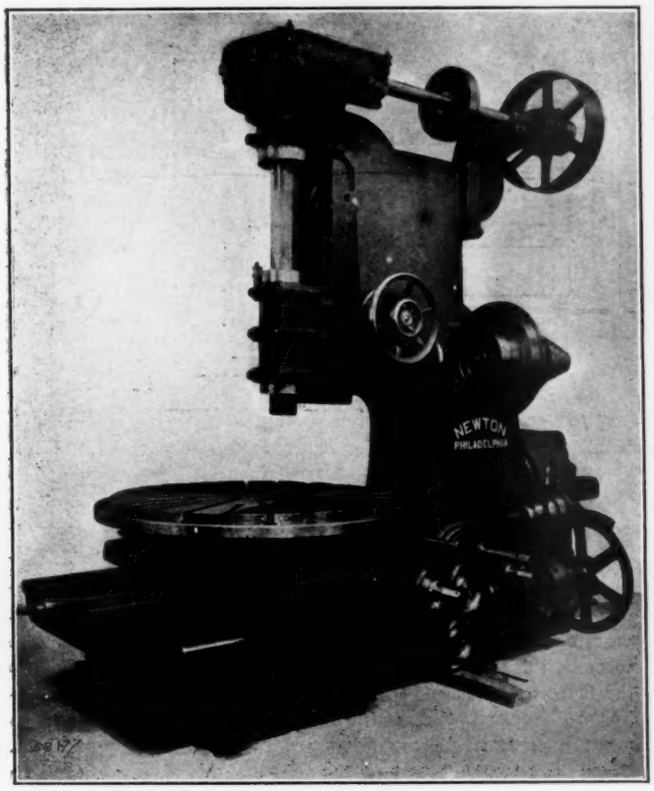
A RAILWAY TO HUDSON BAY.—It is said that at a conference between W. Mackenzie, D. D. Mann and W. H. Moore, of the Canadian Northern Ry., and the Minister of Railways, at Ottawa, September 23, the question of the railway from The Pas, Sask., to Hudson Bay was under discussion. Press reports state that a proposal for the leasing of the line, when built by the Dominion Government, to the Canadian Northern Ry. on an agreement similar to that with the G. T. Pacific Ry., for the operation of the National Transcontinental Ry., Eastern Division, was proposed, but the Minister of Railways said there was nothing of a definite character suggested or considered in regard to the line.

THE VOLATILE MATTER OF COAL is the title of the first bul letin to be issued by the new Federal Bureau of Mines. The authors, Horace C. Porter and F. K. Ovitz, conducted their investigations at the Pittsburg station while it was under the Technologic branch of the Geological Survey, the work being a continuation of the fuel investigations begun several years ago at the Louisiana Purchase Exposition, St. Louis, Mo. The bulletin will be of interest to fuel engineers, designers and builders of gas producers, gas and coke manufacturers, superintendents of power plants, railway master mechanics and those engaged in the suppression of smoke. It may be obtained by applying to the Director of the Bureau of Mines, Washington, D. C.

POWERFUL VERTICAL MILLING MACHINE

The extensive and growing use of milling machines in railroad shops has resulted in a striking development of this comprehensive tool, as well as an enlargement of its scope of usefulness rather startling to contemplate when contrasted with its rather limited field of only a few years ago. In particular heavy milling operations are now undertaken on such a scale that the production of a tool to meet the exacting requirements presents a most interesting problem in machine design.

A new design of vertical milling machine of exceptionally rigid construction throughout, manufactured by the Norton Machine Tool Works Co., Inc., Philadelphia, Pa., is shown in



VERTICAL MILLING MACHINE OF GREAT POWER

the accompanying illustration, and embodies features which are a radical departure from any existing bevel or spur driven machines.

The spindle is 6⅜ in. dia. in the main bearing, which is bronzed bushed and capped, and is 21½ in. long. The driving worm wheel is of very large diameter, and has a bronze ring with teeth of steep lead. The sleeve is cast solid and revolves in a bushed capped bearing, which is bolted to the top of the frame to permit of adjustment should it ever be required to maintain alignment, if the wear has to be compensated for. The maximum distance from the end of the spindle, which is made to rotate with the sleeve by means of a double key way, to the table is 22 in.; length of in and out feed, 33 in.; length of cross feed, 33 in., and distance from center of spindle to upright is 34½ in. The extreme height of the spindle in its highest position is 12 ft. 6 in. A notable feature in connection with the top of the spindle provides a simple design for the attachment of the swinging crane, and also protects the top of the spindle and the driving mechanism from dirt. The spindle saddle is counterweighted; it has square lock gibbed bearings on the upright and adjustments are made by means of taper shoes.

The drive is taken from a General Electric D L C 50, 220 volt, 30 h. p. motor, having a speed of from 400 to 1,200 r. p. m. through a 7-in. belt to the pulley which revolves on the finished end of the bearing in order to give a larger substantial wearing surface. The rotation of the shaft is obtained by keying a large washer on to the shaft which has a broad face key extension fitting into a corresponding slot in the end of the pulley hub. The driving worm is of hardened steel fitted with roller thrust bearings, both of which are bushed and capped. The driving worm and worm wheel are entirely encased, permitting continual lubrication.

Motion for the feed is taken from the intermediate shaft pulley to the two step cone, to which is attached a four step cone of smaller diameter, which is belted to one of equal proportions below. The illustration indicates very clearly the arrangement of these parts. It will be noted that the motion is further transmitted through the large gear, which rotates freely on the horizontal driving shaft and feed can only be obtained by the engagement of the adjacent lever. When this latter is in its opposite position fast traverse is available. The feed and fast power motion are further carried through the double train of bevel gears giving reverse to both motions for the circular, in and out, and cross movements. All gears on this machine are of steel or bronze, and all movements are clutched.

The circular table which is 60 in. in diameter over the "T" slots, and of very heavy construction, is entirely surrounded by an oil pan and has an exceptionally large central bearing in the table saddle. This machine is particularly intended for locomotive work, permitting the heaviest possible cuts, and the intention in the design is to secure as efficient results as can possibly be obtained from this company's plainer type machines, on which they are already removing one cubic inch of metal per h. p. The machine occupies a floor space of about 12 ft. 2 in. by 8 ft. 5 in., with an extension of 5 ft. in the rear when arranged for motor drive.

THE PENNSYLVANIA RAILROAD COMPANY has for many years past, as a result of its operations, realized a substantial surplus in each year over and above the amount required to enable it to meet its interest charges and pay moderate dividends on its stock to its stockholders. This surplus has varied in amount from year to year. For the last ten years the average has been about $12,000,000 a year, practically all of which has been expended on the property for the purpose of enabling the company to conduct its operations more safely, more efficiently and more cheaply.—*President McCrea before the Interstate Commerce Commission.*

NEW PASSENGER DEPOT FOR SACRAMENTO.—The Southern Pacific has appropriated $400,000 with which to erect a new passenger depot in Sacramento, Cal., next year as soon as the new bridge now under construction across the Sacramento River is completed. In addition to the cost of construction the final price will be run up to $500,000 because of the furniture and elaborate finishings, which will make the structure one of the finest stations on the coast.

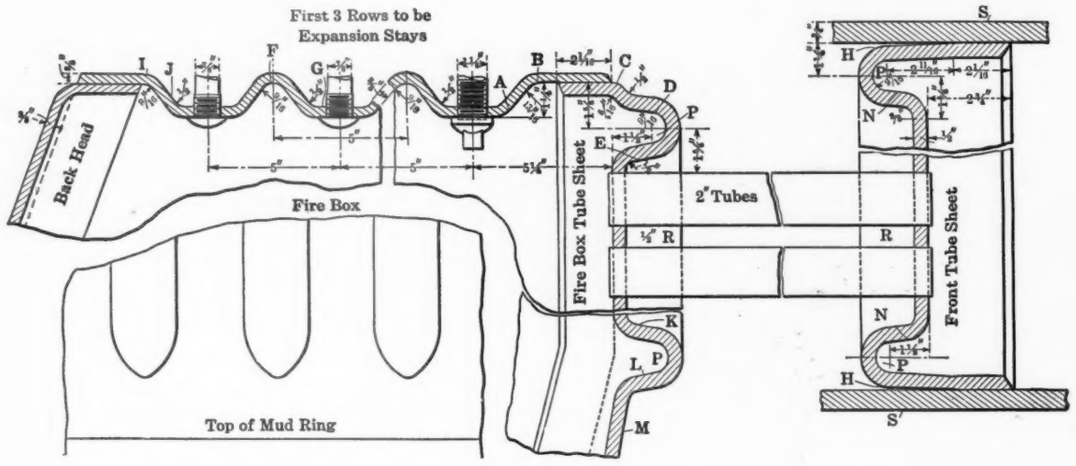
THE HARRIMAN LINES spend very large sums on repairs of equipment and keep their equipment in correspondingly good condition. During 1910 there was a net increase of 46 locomotives in service, 114 passenger train cars and a decrease of 421 freight train cars in service. On June 30 there were 28.93 per cent. of the locomotives in service in thorough order; 41.71 per cent. in good order; 18.34 per cent. requiring repairs, and 11.02 per cent. in shop.

STEAMSHIP TERMINAL AT MONTAUK.—Last month the transportation world was enlivened by a report to the effect that plans were in negotiation by the White Star Line which, if carried through, would make Montauk Point, one of the most Eastern points of Long Island, the American terminal for the great steamships.

NEUTRALIZATION OF STRESSES IN LOCOMOTIVE FIREBOXES

The long continued debate of many years between mechanics in general, in which the rigid staybolt and its constant breakage formed the basis of the discussion, served to establish the superior advantages possessed by the flexible stay, but the principal point—too rigid boiler contruction—which is probably the real cause for so many staybolt failures, has been largely overlooked or lightly touched upon.

It is an unquestioned fact that rigid construction is largely, if not entirely, responsible for leaking rivet seams, firebox sheets distorting and cracking, broken bolts, and continued deterioration of all materials involved in firebox assemblage. The introduction of the flexible staybolt has, of course, done much to right the abnormal conditions which formerly prevailed in connection with the maintenance of fireboxes in service, but its success has not prevented a consistent effort on the part of designers to eliminate the real troublesome feature of rigidity. Toward the attainment of this much-to-be-desired end many devices have been evolved in this and other countries, but, with few exceptions, including that herein illustrated, all were lacking in practical value, and interesting only through novelty in design. The Wood firebox and tube plate arrangement, however, embodies a common sense and practical arrangement, to which the drawing convincingly attests.



FLEXIBLE CONSTRUCTION OF LOCOMOTIVE FIREBOXES AND TUBE SHEETS

It may be briefly mentioned that in referring to this drawing the capital letters marked thereon, with the exception of ("P") ("R") and ("S") indicate the points where expansion and contraction are provided for and neutralized in this form of firebox and tube plates. The letters (F) and (G) refer to formation of corrugation where expansion takes place. The sections of this character have a corresponding deflection, which is sufficient to equalize the tension on the stays.

These various points so indicated are worthy of very careful study. They were determined following the results of a long series of experiments and research into the distribution of stresses, and their formation is intended to serve as a compensating feature for all deformations which must ensue under the ordinary construction. For instance, the arrangement of the tube sheets in the Wood boiler is particularly appealing in that the trouble experienced in regular firebox tube sheets, in extending the tube sheet upwards over the crown sheet, and which is attributed to expanding the tubes from time to time, could not possibly take place, in this design, in the section marked (C) (D) and (E). The extension of the tube sheet at (C) upwards, through the action of the expander, must necessarily be released by the spring of the corrugation marked (P).

From the front tube sheet and firebox tube sheet, each of which have the same leverage on each corrugation which encircles the tubes, it will be seen that the tube sheets (R) are stronger for carrying the tubes and more flexible for allowing their expansion *en masse*. As the expansion of the tubes is in the direction of the firebox tube sheet, the front tube sheet is formed to take care of vertical or horizontal spring at (H), which will not allow the corrugation (P) to come in contact with the boiler sheet (S). The expansion of the tubes coming from the front to the firebox tube plate is released by the spring in corrugation, as in the expansion of the firebox, which would come towards it if not neutralized by formation between each row of staybolts.

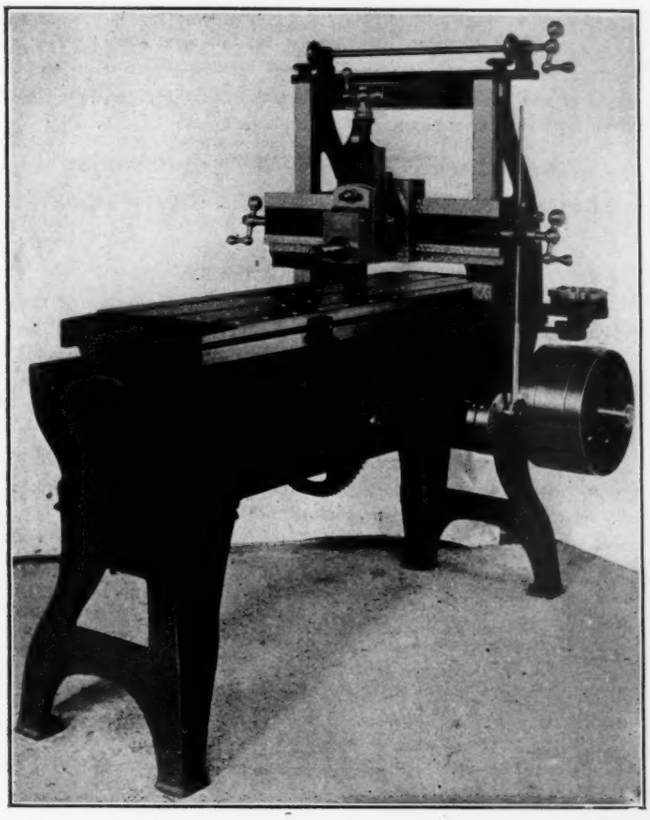
The tension on the mud ring side of the throat sheet will be released to some extent by the spring of the corrugation at the front (L), directly above the throat sheet (M). This has proved itself by allowing the stays on the throat sheet to remain tight and with none broken or leaky after a service of nearly two years on the road. The mud ring on the sides and front by this formation is practically free from the expansion pull towards the firebox tube sheet, whereas if they were not in this formation and straight sheets had been used, the pull would be in direct lines from the mud ring towards the firebox tube sheet, which is the hottest part of the firebox. Attention is called to the back head of the firebox being connected by formation marked (I) and (J), encircling the crown and side of the firebox tube sheet so that the expansion and contraction may be neutralized between the points (A), (B), (C), (D) and (E).

There can be no question but that a firebox in one sheet, as realized in this construction, is better for neutralizing strains than one made with three sheets. The firebox in this latter and usual arrangement must necessarily have a riveted seam on the joint at each side, which prevents the strains from being neutralized through the strength of the riveted seam, which virtually acts as a longitudinal stay between the firebox flue sheet and the back firebox sheet.

ONE MAN LOCOMOTIVES IN SWEDEN.—The Swedish State railways are at present contemplating the adoption of a one-man locomotive for distances with a limited local traffic, and a commencement has already been made over the Orebro-Adolfsberg line. The name, one-man locomotive is, in a way, a misnomer, inasmuch as the driver is not meant to manage the locomotive entirely alone, but the fireman has also to act as guard, collect tickets, etc., or the guard undertakes the duties of fireman, whichever way one may choose to put it. The Swedish State railways have bought ten locomotives with this service in view. This method has been used in other countries, more especially in Germany, for some time and with satisfactory results.

A SMALL PLANER WHICH CAN BE ADAPTED TO A WIDE RANGE OF REPAIR WORK

Although a considerable amount of work, which up to a few years ago was always handled by a planer or shaper, has been turned over to the milling machine, there is still much remaining which needs to be performed on those two tools. This particularly applies to certain features of railroad shop repair work where a small and compact planer becomes an indispensable tool



for the replaning of shoes and wedges, engine truck boxes, crosshead gibs, guide bars and even driving boxes. Two or more such tools will generally be found as an accompaniment to the machine shop of the most recent plants.

A design well adapted for these requirements is the new 16 in. by 16 in. by 3 ft. planer by Schneider and Goosmann, of Cincinnati, O., herein illustrated. It is a well proportioned and substantially built machine which can be run profitably on a wide range of work which would entail a loss of time and needless waste of power if assigned to the larger machines.

The table measures 3 ft. inside the scrap pockets and has a steel rack 4 ft. long, thereby allowing work longer than 3 ft. to be planed if necessary. A clamping device is also provided to prevent the table from lifting when planing extreme lengths. These clamps are located on the inside of the bed, at the center, and bear upon grooves cut in the table just above the V's. The T slots are cut from the solid and four rows of holes are drilled and reamed for ⅝ in. studs.

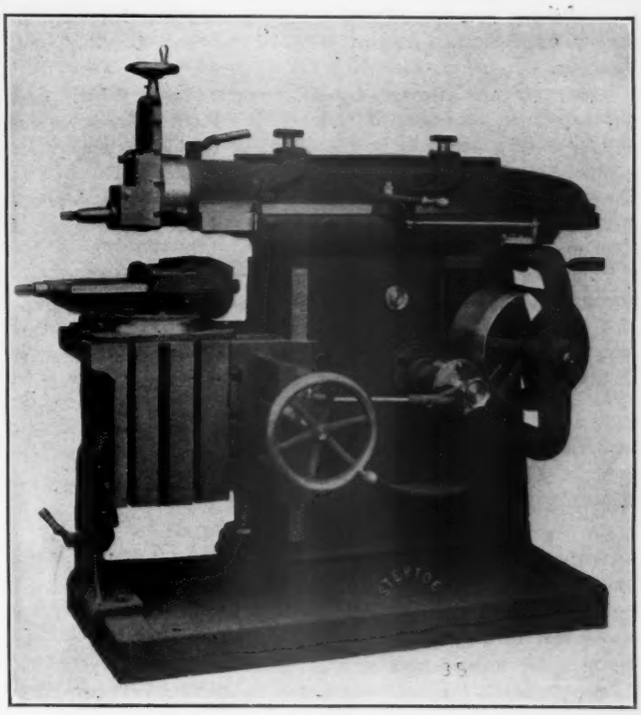
The belt shifting mechanism moves one belt entirely off the tight pulley before commencing to move the other on. A safety plunger is provided to prevent the accidental starting of the planer when the driving belts are running on the loose pulleys. The ratio of belt speed to cutting speed is 32 to 1. Width of belts 1¼ in. The countershaft has tight and loose pulleys 6 in. diameter by 2⅝ in. face. The fly wheel is 11 in. in diameter and acts as a reversing pulley; the other pulley is 5 in. diameter. All parts of the machine are well finished. The shafts are made of high grade machinery steel. The head and cross rail, as well as the housings, are exceptionally strong, and have wide surfaces, all scraped to a fine bearing. The saddle is graduated and the tool slide has an exceptionally long range and has a micrometer dial on the feed screw. The weight of the planer complete with countershaft and wrenches is about 1,150 lbs.

TWENTY-SIX INCH TRIPLE GEARED SHAPER

Prominent among the very interesting new machine tools which have been lately brought out is the new 26 in. triple geared shaper, by the John Steptoe Shaper Co., of Cincinnati, O. This tool was designed to meet the most exacting requirements which can be imposed upon a shaper, and it embodies many distinctive points of merit which invite attention.

For instance, the ram is driven by two rack gears of large diameter, and the rack is cut from solid steel, thereby avoiding the excessive jarring at each end of the stroke, and giving an even pushing strain on both gears. The use of two gears permits the passing of bars through an opening in the top of the column for key seating, which cannot be done where only one large gear is used.

The vise has a graduated swivel base, which is turned at any angle to thirty degrees, so that it can be easily read by the operator. The upper jaw of the vise grips firmly around the lower jaw, thereby preventing the upper jaw from raising when the work is being tightened in the vise. Two additional clamping bolts are provided which project through the upper jaw of the vise, and which can be fastened where extreme accuracy is



necessary, as they will overcome the tendency of the upper jaw to raise when the work is being fastened. The head can be very quickly loosened and swiveled to any angle by pushing the lever at the back of the head, and can again be instantly fastened by pulling the lever toward the operator.

This machine is geared at the rate of about 42 to 1, and is made to take very heavy cuts with high speed steel. The column, ram and base are very heavily ribbed and braced and all bearings are of the most substantial dimensions. Those of the shaft in the column are bushed with cast iron, and have ring oilers, and the shafts are turned with spiral oil grooves to insure the proper distribution of oil over the entire bearing. All wearing surfaces are provided with flat gibs, and the screws for adjusting the gib in the ram and hasp slide have lock nuts to prevent their moving. The lead screw and hasp slide screw are provided with hand wheels, which will be found very convenient.

The Railroad Clubs

CLUB	NEXT MEETING	TITLE OF PAPER	AUTHOR	SECRETARY	ADDRESS
Canadian	Dec. 6	The Modern Railway	Edwin F. Wendt	Jas. Powell	P. O. Box 7, St. Lamberts, Montreal, Que.
Central	Jan. 13	.....	.....	H. D. Vought	95 Liberty St, New York
New England	Dec. 13	The Evolution of Air Brakes	H. N. Lamb	G. H. Frazier	10 Oliver St., Boston, Mass.
New York	Dec. 16	Annual Entertainment and Smoker	.....	H. D. Vought	95 Liberty St., New York
Northern	Dec. 24	Interchange of Cars	Wm. Durgin	C. L. Kennedy	401 W. Superior St., Duluth, Minn.
Pittsburgh	Dec. 23	Testing of Coal	H. M. Wilson	C. W. Alliman	P. & L. E. R. R., Gen. Office, Pittsburgh, Pa.
Richmond	Dec. 9	Work of the Weather Bureau	.....	F. O. Robinson	C. & O. Ry., Richmond, Va.
Southern	Jan. 19	.....	.....	A. J. Merrill	218 Prudential Bldg., Atlanta, Ga.
St. Louis	Dec. 9	.....	.....	B. W. Frauenthal	Union Station, St. Louis, Mo.
Western	Dec. 19	.....	F. S. Sheafe	J. W. Taylor	390 Old Colony Bldg., Chicago
Western Canada	Dec. 12	.....	A. Wilcox	W. H. Rosevear	199 Chestnut St., Winnipeg, Man.

THE TRAINING OF APPRENTICES

CANADIAN RAILWAY CLUB.

At the October meeting P. McLaren, machinery expert of the Grand Trunk Railway, presented a paper, entitled, "Some Thoughts on the Training of Apprentices." The author has had considerable experience in this line of work and gave some very interesting opinions on the method of properly handling it. He does not believe that compulsory education right through is the proper method. He does, however, believe in making attendance at the classes for the first year compulsory and allowing those to drop out who apparently do not have the necessary mental equipment for future progress, still allowing them, however, to continue with their shop work. He recommended holding all classes in the day time. The paper included a brief outline of the proper course of progress for an apprentice, and also briefly outlined the scheme followed on the Grand Trunk Railway.

The paper was discussed by Mr. Powell, who took issue with the author on a number of features. H. Martin Gower, superintendent of apprentices on the Canadian Pacific Railway, after complimenting the paper most highly, stated that he believed that the most important training a boy should receive is the development of character, then common sense and lastly knowledge of skill in his trade.

Following this a number of members took occasion to discuss the subject and considerable information concerning the apprentice work in foreign countries was brought out. H. Lacey Johnson evinced great interest in the subject and spoke at some length in favor of the work now being done along these lines.

AN OFFICIAL'S RELATION TO HIS MEN

NORTHERN RAILWAY CLUB.

At the October meeting, Thomas Owens, superintendent of the Duluth & Iron Range Railroad, Two Harbors, Mich., presented an interesting paper discussing the features of an official which made him successful and popular. He drew attention to the many small things, usually unimportant in themselves, which often resulted in the failure of a man in an official capacity who apparently was particularly well suited for the work. The paper might be summed up in the recommendation to those occupying official positions for the close study and practice of the following qualities: justice, tact, kindness and decision.

FLUE FAILURES

WESTERN RAILWAY CLUB.

J. W. Kelley, foreman boiler maker, Chicago & Northwestern Railway, presented at the November meeting of this club the most interesting and valuable paper on the above subject in which he pointed out the causes of many of the flue failures, some of which have been largely overlooked, and explained a number of methods that had been tried in his shop to overcome these difficulties and the success that had been attained. This paper is too valuable and extensive to be fully reviewed in this place and will be presented in abstract in a later issue.

EDUCATIONAL BUREAU OF THE UNION PACIFIC RAILROAD

CENTRAL RAILWAY CLUB.

Dexter C. Buell, chief of the bureau, presented a paper at the November meeting of the Central Railway Club in which he pointed out the reasons for the organization of the educational bureau and briefly recounted the principles on which it was founded, its method of operation and the results that had been obtained after about a year's experience.

In the October, 1909, issue of this journal, page 392, will be found a brief description of this unique departure in railroad educational work. At the present time Mr. Buell states that the work of the bureau covers the following courses:

Block Signal Maintenance and Operation.
Interlocking.
Signaling.
Elementary Electricity.
Electric Light and Power.
Telegraphy.
Telephony.
Railroad Operation.
Train Operation.
Station Work.
Railroad Accounting.
Freight Traffic.
Passenger Traffic.
Analysis of Statistics.
Track Work in English.
Track Work in Japanese.
Surveying and Mapping.
Railway Civil Engineering.
Railway Mechanical Engineering.
Locomotive Course.
Air Brake Course.
Gas Engines.
Motor Cars and Motor Car Operation.
Mechanical Drawing.
Sheet-Metal Pattern Drafting.
Boiler Construction and Repairs.
Machine Design.
Refrigeration.
Car Building.
Car Repairing.
Shop Practice and Plumbing and Pipe Fitting.

Although no attempt has been made to push this work among the employees, over 1,600 have already asked for assistance and of these 80 per cent. are at present in good standing with the bureau. The scheme of the work is along the lines of the correspondence school, and it has been found necessary to originate many text books.

RAILROAD RELIEF DEPARTMENT

NEW YORK RAILROAD CLUB.

Joseph N. Redfern, superintendent of the relief department of the Chicago, Burlington & Quincy Railroad, read a paper at the November meeting of this club discussing the importance, value and the results of a properly organized relief department, choosing the one on the Burlington, which is generally recognized as being among the best, as an example. The paper also touched upon the comparative justice of the two acts which are now being agitated before Congress, entitled the "Employers' Liability Act" and "The Workman's Compensation Act."

On the Burlington Railroad a little over 50 per cent. of the employees are members of the relief department and about 85 per cent. of the permanent force are members. Practically all of the engine and train men have joined and the average death benefit carried by them is $1,475. They carry an average daily benefit of $1.70 per day. The members are carrying $23,000,000 death benefit and $1,500,000 general accident death benefit.

During the 21 years of the existence of this department the railroad company has expended $1,350,000 in paying operating expenses, which however does not include a large number of items that are ordinarily included in operating expenses of a

department, for instance, office rent, work done by employees of other departments, etc.

The annual reports of the secretary and treasurer of the club show a present total membership of 1,566 and an entirely satisfactory financial condition.

H. S. Hayward, superintendent of motive power of the New Jersey Division of the Pennsylvania Railroad, the newly elected president, was inaugurated at this meeting.

BOOK NOTES

The Indicator Handbook. By Charles N. Pickworth. Cloth, 142 pages, 5 x 7½ inches. Illustrated. Published by D. Van Nostrand & Co., 23 Murray street, New York. Price, $1.50.

This excellent little work constitutes a simple and eminently practical analysis of the principles, construction and operation of the steam engine indicator, and is to be commended for the clearness of its style in handling the subject from every point of view. Interesting chapters are included on errors of the indicator connections, of the reducing rig, and of the indicator, all of which are subjects which merit more attention than they have hitherto received. The book also contains a separate chapter devoted to the use of indicators in connection with gas and oil engines; while optical indicators, pressure indicators, etc., are also given attention.

Machine Drawing. By Gardner C. Anthony. Cloth, 160 pages, 6 x 7½ inches. Illustrated. Published by D. C. Heath & Co., 120 Boylston street, Boston, Mass. Price, $1.50.

The first edition of this book was very widely used in engineering schools of the better sort, and the improvements which the present edition represents should commend it to a still larger number of those interested in the subject. It has been the aim of the author to teach and encourage the use of concise, graphic terms by adopting the idiomatic phrases of the engineer, and to suggest many useful means for acquiring facility in this form of expression. The system of projection taught is that which the best practice demands, and examples have been selected with a view to establishing its principles with the least expenditure of time. The solution of geometric problems is required by practical methods in use by draftsmen, as well as by the ordinary geometric construction. In particular the graphic statement of problems, which gives a definite layout, is a great labor saving device for both instructor and student. The book contains 196 illustrations and 228 problems.

The "Mechanical World" Pocket Book and Year Book for 1910. Published by Emmott & Co., Ltd., 65 King St., Manchester, England. 388 pages, 4 x 6, illustrated. Price 12 cents.

This is the twenty-fourth edition of this valuable little work, and it is fully equal in every way to the high value which has been set upon its predecessors. The book deals comprehensively with the usual engineering questions of design, construction and operation of machinery in general. There is a lengthy section on the shapes, speeds and feeds of cutting tools, with supplementary sections dealing with milling cutters and twist drills. Entirely new sections on standard screw threads, high speed steel and its treatment, and constructive details of gas engines have been added since the last edition, and several additions have been made to the many useful reference tables with which the book abounds. It contains also a most complete index and a diary and memoranda of about 60 pages for 1911.

"THE EFFECT OF KEYWAYS ON THE STRENGTH OF SHAFTS," by Herbert F. Moore, has just been issued as Bulletin No. 42 of the Engineering Experiment Station of the University of Illinois. This bulletin gives the results of tests to determine the relative strength of solid shafts and of shafts with keyways. A table showing power tansmission by cold-rolled shafting with keyways and a diagram illustrating the weakening effect of keyways are given. Copies of Bulletin No. 42 may be obtained gratis upon application to W. F. M. Goss, Director of the Engineering Experiment Station, University of Illinois, Urbana, Ill.

COMMUNICATIONS

ENGINEERING VS. GUESSWORK.

To the Editor:

In the November issue of the AMERICAN ENGINEER regret is expressed that the reporters on boiler design at the Railway Congress did not assign reasons for their preferences toward the round-top or Belpaire boilers. If these reasons had been frankly given, would they not have read something like this: "On the X. & Y. R. R. they had some trouble in the corners of some fireboxes of this type" (which may, or may not, have been well designed), and "Mr. ——— thinks this or that shape about right." How many roads have reached the decision after a thorough investigation of the availability and cost of maintenance of the whole firebox ends of an adequate number of boilers of each type in the same service, there being every reason to believe that each is the best of its type? Yet firebox troubles are acknowledged to be the great source of expense and delay in the motive-power department.

Is this not one of many cases in which the unwillingness to investigate may be causing much needless expense? The concentration of attention upon the business aspects of the motive-power problems have so far superseded interest in them as engineering questions that the investigations are superficial. Then many reports to the Master Mechanics' and Master Car Builders' Associations consist largely of tabulations of practices of the different railroads, established as indicated above; and practice of the majority prevails as "having stood the test of practical experience." It is the belief of the writer that considerable expense could be saved on almost any railroad by more thorough and more independent engineering. G. E.

POSITIONS WANTED

CHIEF DRAFTSMAN, MECHANICAL ENGINEER, ERECTING SUPERVISOR OR ASSISTANT.—Man with sixteen years experience in railroad motive power departments; 10 years served as draftsman and chief draftsman, and 6 years in present position as erecting and machine shop inspector in both car and locomotive departments. Address X. Y. Z.

DESIGNING ENGINEER.—A first-class designing engineer on locomotive works, or tools and equipment. Familiar with modern shop methods and thoroughly original in ideas. Address C. V. F.

CAR AND LOCOMOTIVE DRAFTSMAN.—Man with short experience on railroads and with car building companies wishes position as draftsman where opportunities for advancement are satisfactory. Address H. E. E.

SHOP FOREMAN.—A practical man whose experience includes drafting room, roundhouse, erecting shop and machine shop work, and who is now foreman of one of the best and most efficient shops in the country, desires a better position where ability will receive reward. Address F. G. Q.

MECHANICAL ENGINEER OR CHIEF DRAFTSMAN.—Long experience in the drafting room of railways; at present chief draftsman; wishes position on a southern railway. Address P. F. R.

DRAFTSMAN.—Young man with two years' experience in railroad shop and drawing room desires a position in the west. Address J. C. H.

PERSONALS

W. F. LOWE has been appointed road foreman of engines of the Alabama Great Southern R. R.

F. B. CHILDS, master mechanic of the Northern Pacific, with office at Spokane, Wash., died at Spokane last week.

C. T. RIPLEY has been appointed assistant engineer of tests of the Atchison, Topeka and Santa Fe Ry. at Topeka, Kan.

B. HOFFMAN has been appointed assistant engineer of tests of the Atchison, Topeka and Santa Fe Ry. at Topeka, Kan.

D. E. SULLIVAN, master mechanic of the Union Pacific R. R. at Evanston, Wyo., has had his office removed to Green River, Wyo.

GEO. DONAHUE, formerly superintendent of the Readville shops of the New York, New Haven and Hartford R. R., has resigned.

RUDOLPH ELLZEY has been appointed master mechanic of the Kentwood & Eastern Ry., with office at Kentwood, La., succeeding John May, resigned.

F. E. MARSH, assistant master mechanic of the Pennsylvania R. R. at Trenton, N. J., has been transferred to the machine shops at Altoona, Pa.

S. T. HARRIS has been appointed foreman of car shop at Pratt City, Ala., on the Birmingham Southern R. R., succeeding H. W. Howell, resigned.

B. M. ANGWIN has been appointed master car builder of the Birmingham Southern R. R., with office at Pratt City, Ala., succeeding J. N. Collins, deceased.

GEO. WHITELEY has been promoted from road foreman of engines to master mechanic of District 1, on the Saskatoon division of the Canadian Pacific Ry.

J. L. BUTLER, master mechanic on the White River division of the St. Louis, Iron Mountain & Southern Ry. at Cotter, Ark., has been transferred to Crane, Mo.

F. A. CHASE, formerly general mechanical inspector of the Chicago, Burlington and Quincy R. R., has retired after almost 61 years of continuous service.

S. R. RICHARDS, general inspector of the New York, New Haven and Hartford R. R., has been promoted to be shop superintendent of the company's New Haven shops.

C. R. DOBSON has been appointed general foreman in the car department of the Rock Island Lines, with office at Cedar Rapids, Iowa, succeeding C. Setzekorn, resigned.

G. H. WATKINS has been appointed an assistant master mechanic of the Pennsylvania Railroad, New Jersey division, at Meadows, N. J., succeeding Edwin Schenck, Jr., promoted.

E. B. GILBERT, having resigned the office of superintendent of motive power of the Bessemer and Lake Erie R. R., has been appointed special agent of the motive power department.

H. C. OVIATT, master mechanic of the Western Division of the New York, New Haven and Hartford R. R., has been promoted to be general inspector, with headquarters at New Haven.

LOUIS FLEISCHBEIN has been appointed shop superintendent for the Western Pacific R. R. at Sacramento, Cal. He was formerly general foreman of the Chicago & Alton shops at Bloomington, Ill.

J. F. MCDONOUGH has been appointed master mechanic of the Middle division of the Atchison, Topeka & Santa Fe Ry., with headquarters at Newton, Kan., vice Mr. E. E. Maclovec, transferred.

CHAS. D. CHANDLER has been appointed foreman of machine shop, Oregon Short Line R. R., at Pocatello, Idaho. Mr. Chandler was recently in a similar capacity at Springfield, Mo., on the Frisco lines.

C. J. STEWART, master mechanic of the Central New England R. R., at Hartford, Conn., has been appointed master mechanic of the New York, New Haven & Hartford, R. R., with office at Waterbury.

EDWIN SCHENCK, JR., assistant master mechanic of the Pennsylvania Railroad, at Meadows, N. J., has been appointed assistant master mechanic at the Trenton shops, succeeding F. E. Marsh, promoted.

JOSEPH QUIGLEY, general foreman of the Chattanooga shop of the Cincinnati, New Orleans and Texas Pacific Ry., has been promoted to be master mechanic of the Alabama Great Southern R. R. at Birmingham, Ala.

H. B. HAYES, general foreman of the Danville, Ky., shop of the Cincinnati, New Orleans and Texas Pacific Ry., has been transferred to the Chattanooga shop of that road, succeeding Joseph Quigley, promoted.

OSCAR KUENZEL, formerly an editor on this Journal, has been appointed assistant engineer of tests of the Santa Fe, with headquarters at Topeka, Kansas.

G. W. LILLIE has been made an assistant superintendent of the Idaho division of the Oregon Short Line R. R. at Pocatello, Idaho, in charge of mechanical matters, including the supervision of the Pocatello shops and roundhouse.

GEO. A. HOLDEN, formerly roundhouse foreman on the Michigan Central R. R. at Michigan City, Ind., has been promoted to general foreman of the locomotive department, with office at Grayling, Mich., succeeding E. A. Keeler, transferred.

H. C. MAY, master mechanic of the Louisville & Nashville R. R., at South Louisville, Ky., has been appointed superintendent of motive power of the Chicago, Indianapolis & Louisville, with office at Lafayette, Ind., succeeding O. S. Jackson.

WM. GARSTANG, superintendent of motive power of the Cleveland, Cincinnati, Chicago & St. Louis Ry. at Indianapolis, Ind., has been appointed also superintendent of motive power of the Cincinnati Northern R. R., with office at Indianapolis.

FREDERICK B. CHILDS, master mechanic on the Northern Pacific Ry., recently died suddenly of apoplexy, being stricken while on an inspection trip to Spokane, Wash. He was 46 years of age and was formerly in the employ of the Great Northern Ry.

G. M. GRAY, mechanical engineer of the Bessemer & Lake Erie R. R., at Greenville, Pa., has been appointed superintendent of motive power, with office at Greenville, succeeding E. B. Gilbert, who has been appointed special agent of the motive power department.

C. T. BOYNTON has been promoted from night foreman at Avon, N. Y., shops, Erie R. R., to be general foreman at the same terminal. Mr. Boynton succeeds H. Clay, who has been transferred to the Erie shops at Dunmore, Pa., as machine shop foreman.

R. G. SMOCK, secretary of the St. Paul and Des Moines R. R., with office at Des Moines, Ia., will hereafter have charge of the purchase of all materials and supplies. This is incidental to the resignation of W. J. Souder as auditor and purchasing agent of that railroad.

GEORGE HUNTER, former master mechanic at Palestine, Tex., for the International & Great Northern R. R., and for the past few years master mechanic for the Kansas City Southern at Pittsburg, Kan., has been made master mechanic of the Missouri Pacific Ry. at Jefferson City, Mo.

WILLARD KELLS, master mechanic of the Lehigh Valley R. R. at Buffalo, N. Y., has resigned. Mr. Kells will go to the Atlantic Coast Line as assistant general superintendent of motive power with headquarters at Wilmington, N. C. Mr. Kells has been in the service of the Lehigh Valley for the last ten years.

A. P. PRENDERGAST, master mechanic of the Baltimore & Ohio R. R. at the Mount Clare shops, Baltimore, Md., has been appointed superintendent of motive power of the Baltimore & Ohio Southwestern R. R., with office at Cincinnati, Ohio, succeeding John Hair, resigned. This appointment became effective Nov. 16.

ROBERT POTTS, who until his retirement from active service seven years ago was master car builder of the Michigan Central R. R. at St. Thomas, Ont., in which capacity he served for nearly 25 years, died recently, aged 71 years. Since leaving the car department he had been general inspector of the Buffalo-Detroit division.

W. H. HAMILTON, division master mechanic at Argentine, Kan., on the Atchison, Topeka & Santa Fe Ry., has been transferred to Chanute, Kan., succeeding A. Mitchell, retired. E. E. Machovec, division master mechanic at Newton, Kan., succeeds Mr. Hamilton, and James McDonough, general foreman at Emporia, Kan., succeeds Mr. Machovec.

C. M. HOFFMAN, assistant superintendent of the Oregon Short Line R. R. and the Southern Pacific Lines east of Sparks at Pocatello, Idaho, in charge of mechanical matters, has been appointed superintendent of motive power of the St. Louis, Brownsville & Mexico Ry., with office at Kingsville, Tex., succeeding John Nicholson, resigned.

A. DINAN, division master mechanic of the Atchison, Topeka & Santa Fe Ry., at St. Madison, Iowa, has been appointed mechanical superintendent of the southern district of the western lines, with office at Amarillo, Tex. He will have jurisdiction over the Pan Handle division and territory from Clovis, Tex., to Belen, but not including shops or roundhouse at Belen.

M. J. DRURY, mechanical superintendent of the northern district of the Atchison, Topeka & Santa Fe Ry., at La Junta, Col., has now jurisdiction over the Albuquerque shops and roundhouse, which have been transferred from the coast lines to the northern district. The latter now includes the Western, Arkansas River, Colorado, New Mexico and Rio Grande divisions.

L. R. LAIZURE has been promoted from general foreman of the Susquehanna shops, Erie Railroad, to be master mechanic of the Cleveland shop, including the Mahoning division. Mr. Laizure has had a varied experience on the Erie R. R. as inspector for new equipment and general foreman at the large shops, Hornell and Susquehanna, respectively. He succeeds H. B. Brown, resigned.

H. B. BROWN, for several years master mechanic of the Mahoning Division of the Erie R. R. at Cleveland, O., has resigned to enter the service of the Illinois Central R. R. at Memphis, Tenn., in a similar capacity. Before accepting employment with the Erie Mr. Brown's previous experience had been altogether with the Baltimore and Ohio R. R. as machinist, engineer, road foreman of engines and master mechanic.

J. E. MUHLFELD, formerly general superintendent of motive power of the Baltimore and Ohio R. R., and since leaving that road engaged in special mechanical expert work for several roads, has been appointed vice-president and general manager of the Kansas City Southern Ry., with headquarters in Kansas City. He succeeds William Coughlin, who had the title of general manager and recently resigned. Mr. Muhlfeld will be in charge of transportation, maintenance of way and equipment, and the engineering and purchasing departments.

WILLIAM C. ENNIS, for many years master mechanic of the old New Jersey Midland Railroad, and its successor, the New York, Susquehanna and Western R. R., died at has home in Paterson, N. J., on October 30, in his 66th year. Mr. Ennis at one time held the position of master mechanic on the Central New England R. R. and Delaware and Hudson R. R., in addition to serving the American Locomotive Company in various capacities. He was a member of the New York Railroad Club, and an associate member of the American Railway Master Mechanics' Association.

W. H. DOOLEY, master mechanic of the Alabama Great Southern R. R. at Birmingham, Ala., has been appointed superintendent of motive power of that company and the Cincinnati, New Orleans & Texas Pacific, with office at Ludlow, Ky., succeeding J. P. McCuen, retired on account of ill health. Mr. Dooley was formerly a resident of Paterson, N. J., and learned the machinist's trade in the old Grant and the Rogers Locomotive Works of that city. Before going South about ten years ago he was with the Erie R. R. at the Bergen junction ships.

CHARLES E. RANDALL, railroad representative of Manning, Maxwell and Moore, died suddenly in Buffalo, N Y., on October 22. Mr. Randall was sixty-nine years old. He had attained a wide acquaintance with railroad officials throughout the country, and his modest and unassuming demeanor with his readiness to oblige at any and all times had made them to a man his appreciative friends. On account of the death of his father he was obliged to go to work at the age of fourteen, at which time he became an apprentice in the Taunton Locomotive Works. At twenty-five he was chief engineer on a steamboat. A few years later he went with the Hartford Steam Boiler Works, in East Boston, where he was employed until 1879. On June 1, 1881, he entered the employ of the Hancock Inspirator Company as mechanical engineer and salesman, and has been connected with them since that time. When Manning, Maxwell & Moore, Inc., purchased the Hancock Inspirator in 1900, Mr. Randall then became associated with that company and has represented its allied industries, the Ashcroft Manufacturing Company, the Consolidated Safety Valve Company, the Hayden & Derby Manufacturing Company and the Hancock Inspirator Company. The funeral was held at Boston at 2 P. M. on October 25th.

CATALOGS

IN WRITING FOR THESE PLEASE MENTION THIS JOURNAL.

DECORATIVE LIGHTING OUTFITS.—The General Electric Company has just issued a folder, No. B-3011, describing its decorative lighting outfits for Christmas trees.

FEED WATER TREATMENT.—The Dearborn Drug and Chemical Works, in a booklet entitled "The Treatment of Boiler Feed Waters," explains the Dearborn methods and gives much valuable information in connection with scale formation and boiler incrustation in general.

BOLT CUTTERS. NUT TAPPERS AND PIPE THREADERS.—Catalog No. 28, issued by Wells Brothers Co., Greenfield, Mass., describes and illustrates the complete line of the above Little Giant tools manufactured by the company and contains instructions for sharpening taps, dies and die bands, with several thread tables of value.

METALLIZED FILAMENT INCANDESCENT LAMPS.—General Electric Co. bulletin 4780 describes and illustrates the Gem lamp, which has a higher economy and greater illuminating power than the carbon, although less efficient than either the tantalum or mazda. This bulletin supersedes all previous bulletins on the subject.

GRAPHITE PRODUCTS.—A new booklet has just been issued by the Joseph Dixon Crucible Co., of Jersey City, N. J., covering the Dixon line of products that are widely used in railroad service. The booklet runs to 40 pages, and is quite attractively illustrated by means of photographs showing different views of railroad stations and yards, different types of locomotives, stretches of track, signals, bridges, etc.

THERMIT RAIL WELDING.—This interesting operation forms the title of a most complete catalogue by the Goldschmidt Thermit Co., 90 West St., New York. It is doubtful whether the subject could possibly be treated with more clearness in the same number of words than is exhibited in this book of 16 pages. It is finely illustrated from photographs which are directly to the point as explanatory of the text.

HOT METAL WORKING MACHINES.—The Ajax Manufacturing Co. has just issued a new catalogue which fully illustrates the various lines of the Ajax machines, together with the many products produced in them by the machine method. The catalogue devotes several pages to the illustration of photographic reproductions of the wide range of forgings which are possible through the use of forging machines. The book is also very complete in useful reference tables in connection with this work.

CAST STEEL VALVES AND FITTINGS.—The Crane Co., of Chicago, Ill., in a special steel catalogue, presents the line of the above which they have been manufacturing for some time to meet the steadily growing demand for a superior grade of goods especially adapted for high pressure saturated and superheated steam lines and extreme hydraulic service. The catalogue contains 64 pages and illustrates the steel valves and fittings which are ordinarily considered standard, with a variety of useful information in connection therewith.

DRAFT GEAR.—The T. H. Symington Co., manufacturers of the Farlow draft gear, has issued a very attractive catalogue covering its features in detail which are associated with this arrangement. The book contains several excellent cuts of the assembled gear and the various component parts. Two of its illustrations in particular are of much interest in demonstrating the ease and rapidity with which the "coupler without a yoke" can be removed when contrasted with the yoke coupler.

CUTTER GRINDERS.—This is the title of a catalog issued by the R. K. Le Blond Machine Tool Co., of Cincinnati, O., which through the completeness of presentation becomes a treatise on the subject. The book is handsomely illustrated with many most interesting photographic reproductions of the Universal Cutter and Tool Grinder at work on actual operations. The machine is shown at work on a wide range of subjects, including milling cutter teeth, cut-off saw, reamers, drills and mandrels. The catalog contains 70 pages and carries a great amount of useful information on this subject.

UNIT SWITCH CONTROL.—The new Westinghouse hand operated switch control is attracting much interest and favorable comment among railway men. The company made this control an attractive feature in its exhibit at the Atlantic City Convention and has just issued a very complete circular, No. 1189, descriptive of the system. Recent orders placed with the Westinghouse Co. for this HL control include equipments for the following roads: Ohio Electric Company, Illinois Traction Company, Peoria Railway & Terminal Company, Winona Interurban Railway Company, Indiana Union Traction Company, Alton, Jacksonville & Peoria Ry.

ARTICULATED COMPOUND LOCOMOTIVE.—Bulletin No. 1006, issued by the American Locomotive Co., entitled "Manual of the American Articulated Compound Locomotive," clearly describes and illustrates this type of construction which has attained a considerable vogue in this country. Considerable space in the bulletin is devoted to a description of the intercepting valve and its operation, and to the power reversing gear and by-pass valves. The bulletin is accompanied by a most elaborate inset drawing, covering the various positions of the intercepting valve under different conditions, which is a work of art in itself.

ELECTRIFICATION OF THE CASCADE TUNNEL.—The General Electric Co. has recently issued a very attractive bulletin illustrating and describing the electrical equipment of the Great Northern Railway in the Cascade Tunnel Division. The section electrified is part of the main line, including the tunnel through the Cascade Mountains. The difficulties encountered before electrification and the manner in which they were overcome are told in Bulletin No. 4755. As similar conditions exist on other trunk lines, this pamphlet will be of interest to show the ability of electric traction to handle traffic satisfactorily on sections of other railroads where, owing to certain physical conditions, operation of the steam locomotive is undesirable.

WATTHOUR METERS.—A very instructive pamphlet on the principles of construction and operation of watthour meters has just been issued by the Westinghouse Electric and Manufacturing Company. Though in the form of a descriptive circular, the pamphlet goes at some length into the question of rates and the theory of meters, and points out the importance of the various features and adjustments of modern meters, both A. C. and D. C. Even to one reasonably familiar with the subject, the pages on "Selection of Watthour Meters" will bring out valuable points often lost sight of. The circular is well worth the attention of those interested in meter operation. Its title is Circular 1137.

LOCOMOTIVES FOR PASSENGER SERVICE.—Record No. 67, issued by the Baldwin Locomotive Works, Philadelphia, Pa., illustrates and describes fourteen locomotives recently built by that company for passenger work. The designs shown include several wheel arrangements and cover a wide range in weight and capacity. For high speed work where sufficient adhesion can be secured in a locomotive with two pairs of driving wheels the Atlantic type appears to be favored because of its large steaming capacity. The Record indicates that where the trains are so heavy that three pairs of driving wheels are required, the Pacific type is generally employed. The Record maintains its usual attractive appearance and typographical excellence.

NOTES

SAFETY CAR HEATING AND LIGHTING CO.—This firm announces that its office for the southeastern district, at Washington, D. C., has been removed from the Home Life Building to 506 Munsey Building.

BURTON W. MUDGE & CO.—This company, which manufactures the Garland car ventilation devices, has appointed J. L. Phillips manager of its electric railway department. Car ventilation is a very live subject with electric railways, and Mudge & Co. have recognized this fact by organizing a department devoted to that particular line.

GISHOLT MACHINE CO. AND JOSEPH T. RYERSON & SON.—In connection with the association of interests which has been formed between these two companies, it is further announced that coincident with the new relationship, Edward T. Ryerson and Clyde M. Carr, of Joseph T. Ryerson & Son, become directors of the Gisholt Machine Co.

EDGAR ALLEN AMERICAN MANGANESE STEEL CO.—Walter Brinton, superintendent of the manganese steel department of the Taylor Iron and Steel Co. since 1895, has resigned to accept a position with the above company as consulting engineer. Mr. Brinton's headquarters will be at the Newcastle, Del., plant.

RELIANCE ENGINEERING AND EQUIPMENT CO.—F. G. Bolles, commercial engineer of the Allis-Chalmers Co., has resigned in order to devote his entire time to the above company at 1417-1419 Majestic Bldg., Milwaukee, Wis., in which he has an equal interest with C. A. Tupper and others. The company, which is taking on a number of additional exclusive agencies, will remove December 1 to 415, 416 and 417 Engineering Bldg., and will considerably extend the scope of its operations.

DUFF MANUFACTURING CO.—Announcement has been made by this company, of Pittsburgh, Pa., that it has acquired the business of William Forgie, Washington, Pa. The transaction implies the purchase of the entire Forgie plant, including its business and all rights and privileges of making the oil well jacks which were originated by William Forgie in the early days of the business. While the Duff company will continue to manufacture its own jacks, they will take up all of the original Forgie models and place them on the market.

JOHN I. ROGERS has opened a New York office in the City Investing Building at 165 Broadway, and will now use it as his Main Office. He is making a specialty of forging by the steam hammer, the drop hammer and the hydraulic press; of special rolling, such as railway tires and rolled wheels; of the use and manufacture of alloy steels; of machine shops and power plants and of general iron and steel works engineering. Mr. Rogers resigned from the Midvale Steel Company of Philadelphia about one year ago to take up professional practice and since that time has been engaged in consultation work and design along the above lines.

FALLS HOLLOW STAYBOLT COMPANY.—It is announced by this company that Thomas F. Meek, 415 Moffat Building, Detroit, Mich., has been appointed their representative for Southern Michigan, and the boiler trade in Toledo, O. Mr. Meek was secretary and manager of sales for the Detroit Steel Casting Company for twenty years. He has a wide circle of friends and his genial disposition and excellent reputation should combine to make him popular and successful in his new line of work. It is also announced that Frank R. Goehler has been appointed the Chicago railroad representative of this company, with office at 1143 Marquette Building, Chicago, Ill. Mr. Goehler was formerly connected for some four years with the purchasing department of the A. T. & S. F. Ry. Co. at Chicago, resigning to accept a position as Factory Business Manager with The Buda Company, at their works at Harvey, Ill. He is a young man of wide business acquaintance, with whom he enjoys a most excellent reputation.

FOR YOUR CARD INDEX

Some of the more important articles in this issue arranged for clipping and insertion in a card index. Extra copies of this page will be furnished to subscribers only for eight cents in stamps.

Boiler Washout System AMER. ENG., 1910, p. 469 (December).

Fully illustrated description of the National Boiler Washing Co.'s apparatus as applied in Corning enginehouse, N. Y. C. Lines.

Coaling Station at Corning, N. Y.

AMER. ENG., 1910, p. 463 (December).

Reinforced concrete structure of the Holman balanced bucket type, coaling on three tracks. Steam heated, electric lighted and altogether an excellent example of up-to-date construction and arrangement. Does not have weighing hoppers. Built by Roberts & Schaefer Co., Chicago.

Doors—Engine House AMER. ENG., 1910, p. 467 (December).

Photographs and drawings showing the construction of the Pitt balanced doors as used for enginehouses, example being at Corning, N. Y., on the N. Y. C.

Locomotive—2-6-6-2 Type, C. & O. Ry.

AMER. ENG., 1910, p. 471 (December).

Illustrated description of locomotives built by the American Locomotive Co. Very large boiler with 6 ft. 6 in. combustion chamber and 24 ft. tubes. Boiler is illustrated and described.

Locomotive Terminal AMER. ENG., 1910, p. 461 (December).

NEW YORK CENTRAL LINES AT CORNING, N. Y.

Complete and fully illustrated description of a terminal constructed from the standard plans of the N. Y. C. & H. R. R. Has a 30 stall enginehouse. Large and fully equipped power house. An excellent machine shop. Reinforced concrete coaling station, which is steam heated and electric lighted.

Machine Tools—Lathes AMER. ENG., 1910, p. 490 (December).

Illustrated description of recent engine and motor driven lathes designed and built by the American Tool Works Co., Cincinnati.

Machine Tools—Radial Drill

AMER. ENG., 1910, p. 488 (December).

Fully illustrated description of very powerful radial drill built by the Fosdick Machine Tool Co. of Cincinnati.

Machine Tools—Shaper AMER. ENG., 1910, p. 495 (December).

Illustrated description of a 26-inch triple geared shaper. Built by John Steptoe Shaper Co., Cincinnati.